INSTRUCTION MANUAL

Motorola®

IN USE THE WORLD OVER
FM
FREQUENCY MODULATION

THE "RESEARCH" LINE
of
RADIO COMMUNICATIONS EQUIPMENT

UNIVERSAL UNI-CHANNEL MOBILE STATION

FM 2-WAY RADIO MODELS

152-174 MC. 10 WATT RF POWER

Motorola
Communications & Electronics Division

4545 W. AUGUSTA BLVD., CHICAGO 51, ILL.

Printed in U. S. A.

68P836075
Issue - O

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ADDENDUM

#T111

MANUAL AFFECTED:

TITLE	PART NO. & ISSUE
152-174 MC., 10 WATT UNIVERSAL UNI-CHANNEL MOBILE	68P836075-O

SECTIONS AFFECTED:

TITLE	PART NO. & ISSUE
DESCRIPTION	68P836075-O
RECEIVER	68P836081-O
TRANSMITTER	68P836082-O

CHANGES:

1. Description Section

Refer to paragraph 4h (page 4).

Add D27 Crystal (heater type) as an alternate to the A17 Crystal (non-heater type) for use as the primary control element of the receiver.

Add DS1 Crystal (heater type) as an alternate to the ASL1 Crystal (non-heater type) for use as the primary control element of the transmitter.

2. Receiver Section

a. Refer to NOMINAL PERFORMANCE SPECIFICATION chart (page 2).

(1) Change TEMPERATURE RANGE AND FREQUENCY STABILITY specification to read as follows:

Using A17 Crystal (non-heater type) - overall stability is maintained within ±0.0020% of assigned center frequency from -30°C. to +60°C. ambient (+25 C. reference).

Using D27 Crystal (heater type) - overall stability is maintained within ±0.0006% of assigned center frequency from -30°C. to +60°C. ambient (+25°C. reference).

(2) Change the PRIMARY POWER INPUT DRAIN specifications to include the following:

When using a heater type crystal - Intermittent Drain: Each Crystal Heater, 0.8 amps at 6.3 VDC or 0.4 amps at 12.6 VDC.

b. Refer to paragraph 1c (page 4).
Add D27 as alternate to A17 on chassis complement chart.

c. Refer to paragraph 8d, CRYSTAL PARTS LIST (page 28).
Add the following crystal as an alternate to the MOTOROLA A17 Crystals listed in the parts list:

Y 101	1U830062	CRYSTAL UNIT, quartz: Receiver Oscillator; 26.40000-32.40000 mc.; with 6 volt heater unit; MOTOROLA type D27; when ordering frequency must be specified; includes: 1U830058 Crystal Unit; MOTOROLA Type B27 1U891880 Heater & Thermostat Assy.; MOTOROLA Type D0X
Y 201		Same as Y 101; used for 2-freq. operation only.

d. Refer to Schematic Diagrams 63E835289-A and 63E835299-A.
Revise NOTE 4 (Diagram 63E835289) and NOTE 3 (Diagram 63E835299) to read as follows:

Heater or non-heater type crystals may be used with T33G and D33G Series Mobile Models.

3. Transmitter Section

a. Refer to Model Chart (page 1).
Change crystal references to read "ASL1 or DS1".

b. Refer to NOMINAL PERFORMANCE SPECIFICATION Chart (page 2):
(1) Change TEMPERATURE RANGE AND FREQUENCY STABILITY specification to read as follows:

Using ASL1 Crystal (non-heater type) - overall stability maintained within ±0.0020% of assigned center frequency from -30°C. to +60°C. ambient (+25°C. reference).

Using DS1 Crystal (heater type) - overall stability maintained within ±0.0006% of assigned center frequency from -30°C. to +60°C. ambient (+25°C. reference).

(2) Change the primary power input drain specifications to include the following:

When using a heater type crystal - intermittent drain: Each crystal heater; 0.8 amps at 6.3 VDC or 0.4 amps at 12.6 VDC.

c. Refer to paragraphs 2a. and 2b. (pages 3 and 4).
Change crystal references to read "ASL1 or DS1".

d. Refer to paragraph 9e, CRYSTAL PARTS LIST (page 23).
Add the following crystal as an alternate to the MOTOROLA ASL1 crystals listed in the parts list:

Y 101	1U835627	CRYSTAL UNIT, quartz: Transmitter oscillator; 1250-16,000 kc; with 6 volt heater unit MOTOROLA type DS1; when ordering frequency must be specified; includes; 1U835624 crystal unit 1U891880 heater & thermostat Ass
Y 201		Same as Y 101; used for 2-freq. operation onl

e. Refer to Schematic Diagram 63E835284-O.
Revise NOTE 7 to read as follows:

Heater or non-heater type crystals may be used with T33G and D33G Series Mobile Models.

REASON FOR CHANGE:

To include heater type control crystals as alternates to the non-heater type control crystals for the transmitter and receiver of all D33G and T33G Series Mobile Radio Models.

ATTACHMENTS:

None

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SERVICE BULLETIN

#577

Nature of Change:

1. Added selenium rectifier to Power Supply Models TU117, TU117-F, TU212, TU212-F and TU189 to reduce reverse current.
2. Added 4 resistors to Power Supply Model TU154 to reduce hash pick-up.

Instructions Affected:

INSTRUCTIONS MANUALS

Title	Part No. & Issue	Section Title	Section Pt. No.
1. 25-54 MC Mobile & AC Utility Station	68P836040-O	Power Supply	68P836035-O
2. 152-174 MC, 25/30 Watt, Mobile & AC Utility Station	68P835265-O	Power Supply	68P836035-O
3. 152-174 MC, 10 Watt Universal Uni-Channel Mobile Station	68P836075-O	Power Supply	68P836083-O

Chassis & Diagrams Affected:

With changes contained herein the following new chassis versions and new diagram issues become effective:

POWER SUPPLIES

Description	Chassis No.	New Version	Diagram Number	New Issue
Vibrator Power Supply, Trunk Mount	TU117-4	-5	63D831716-D	-E
Vibrator Power Supply, Front Mount	TU117-F-1	-2	63D835298-B	-C
Vibrator Power Supply, Trunk Mount	TU212	-1	63D836037-O	-A
Vibrator Power Supply, Front Mount	TU212-F	-1	63D836038-O	-A
AC Power Supply	TU189	-1	63D835279-O	-A
Vibrator Power Supply	TU154-3	-4	63D831717-D	-E

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Change Details:

Nature of Change	Ref. Symbol	Part Number	Description
1. Models TU117, TU117-F			
ADD	CR 6	48A800116	RECTIFIER, metallic: selenium; 1 plate
2. Models TU212, TU212-F			
ADD	CR 10	48A800116	RECTIFIER, metallic: selenium; 1 plate
3. Model TU189			
OMIT	CR 6	48B830268	RECTIFIER, metallic: selenium; 2 plate
ADD	CR 6	48A800116	RECTIFIER, metallic: selenium; 1 plate
ADD	CR 7	48A800116	RECTIFIER, metallic: selenium; 1 plate
4. Model TU154			
ADD	R 19	6R6415	RESISTOR, fixed: carbon; 100 ohm ±10%; 1 w; ins.
ADD	R 20	6R6415	RESISTOR, fixed: carbon; 100 ohm ±10%; 1 w; ins.
ADD	R 21	6R6415	RESISTOR, fixed: carbon; 100 ohm ±10%; 1 w; ins.
ADD	R 22	6R6415	RESISTOR, fixed: carbon; 100 ohm ±10%; 1 w; ins.

Supplementary Remarks:

1. CR 6 is added in series with existing CR 5 (TU117, TU117-F).
2. CR 10 is added in series with existing CR 9 (TU212, TU212-F).
3. CR 7 is added in series with CR 6 (TU189).
4. Resistor R 19 added from pin #1 of vibrator E 1 to ground.
   Resistor R 20 added from pin #6 of vibrator E 1 to ground.
   Resistor R 21 added from pin #6 of vibrator E 2 to ground.
   Resistor R 22 added from pin #1 of vibrator E 2 to ground.

Attachments:

None

Date & Authority:

(1) Effective in production 3/26/54.
(2) Authorized by Eng. on CR #C-6951, date 4/1/54.

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SERVICE BULLETIN

#573

Nature of Change:

Capacitor values changed in the Clipper Stage of TA104 Series Transmitters to increase maximum deviation. TA139 Series Transmitters also affected to retain parts uniformity.

Instructions Affected:

Title	Part No. & Issue	Section Title	Section Part No.
25-54 MC MOBILE - AC UTILITY STATION	68P836040-O	TRANSMITTER	68P836046-O
152-174 MC MOBILE - AC UTILITY STATION	68P835265-O	TRANSMITTER	68P835280-O
152-174 MC UNIVERSAL UNI-CHANNEL	68P836075-O	TRANSMITTER	68P836082-O

Chassis & Diagrams Affected:

With changes contained herein the following new chassis versions and new diagram issues become effective:

25-54 MC MODELS

Description	Chassis & Suffix No.	New Suffix	Diagram No.	New Issue	Ref. Issue
1-Freq. Transmitter	TA104-4	-5	63E836043	-A	-O
2-Freq. Transmitter	TA104-C2-4	-5	63E836043	-A	-O
1-Freq. Basic Chassis	TU113-4	-5	63E836043	-A	-O
2-Freq. Basic Chassis	TU113-C2-4	-5	63E836043	-A	-O

152-174 MC MODELS

Description	Chassis & Suffix No.	New Suffix	Diagram No.	New Issue	Ref. Issue
* 1-Freq. Transmitter	TA139	-2	63E835284	-B	-O
* 2-Freq. Transmitter	TA139-C2	-2	63E835284	-B	-O
* 1-Freq. Basic Chassis	TU187	-2	63E835284	-B	-O
* 2-Freq. Basic Chassis	TU187-C2	-2	63E835284	-B	-O

* Revised 4/23/54

SB # 573
DATE 4/20/54

Change Details:

1. INSTRUCTION MANUAL 68P836040-O

EFFECTIVE WITH THIS SERVICE BULLETIN, THE PARTS LIST FOR SCHEMATIC DIAGRAM 63E836043-O IS CHANGED TO INCORPORATE THE FOLLOWING NEW OR REVISED COMPONENTS.

Service Bulletin	Symbol	Part Number	Description
573	C 124	21R401029	CAPACITOR, fixed: .02 mf +80-20%; 500 vdcw
573	C 125	21R401029	CAPACITOR, fixed: .02 mf +80-20%; 500 vdcw
573	C 126	8K836753	CAPACITOR, fixed: .0025 mf ±10%; 100 vdcw

2. INSTRUCTION MANUALS 68P835265-O AND 68P836075-O

EFFECTIVE WITH THIS SERVICE BULLETIN, THE PARTS LIST FOR SCHEMATIC DIAGRAM 63E835284-O IS CHANGED TO INCORPORATE THE FOLLOWING NEW OR REVISED COMPONENTS.

Effective with Service Bulletin	Symbol	Part Number	Description
*598	C 132	21R401029	CAPACITOR, fixed: .02 mf +80-20%; 500 vdcw
*598	C 133	21R2748	CAPACITOR, fixed: 200 mmf ±10%; 500 vdcw
573	C 127	21R401029	CAPACITOR, fixed: .02 mf +80-20%; 500 vdcw

Supplementary Remarks:

*Per SB #598: C 132 is connected between pins 3 and 4 of V 107. C 133 is connected between pins 1 and 2 of V 107.

Attachments:

None

Date & Authority:

(1) Effective in production 5/1/54.
(2) Authorized by Eng. on CR# C-6937, date 4/20/54.

*Revised 4/23/54

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SERVICE BULLETIN

#582

Nature of Change:

Addition of 82K ohm resistor (R 155) to limiter screen grid circuit of TA140 Series Receivers to permit operation with control heads not incorporating a DC type volume control.

Instructions Affected:

Title	Part No. & Issue	Section Title	Section Part
152-174 MC. UNIVERSAL UNI-CHANNEL 10 WATT MOBILE STATION	68P836075-O	RECEIVER	68P836081-O

Chassis & Diagrams Affected:

With change contained herein the following new chassis version and new diagram issue become effective:

Description	Chassis No.	New Version	Diagram No.	New Issue
Receiver, 1-Freq, TU145 Filter	TA140	-1	63E835289	A
Receiver, 1-Freq, K-9242 Filter	TA140-X	-1	63E835289	A
Receiver, 2-Freq, TU145 Filter	TA140-R2	-1	63E835299	A
Receiver, 2-Freq, K-9242 Filter	TA140-X-R2	-1	63E835299	A
Basic Chassis, Receiver, 1-Freq	TU188	-1	--------	--
Basic Chassis, Receiver, 2-Freq.	TU188-R2	-1	--------	--

Date & Authority:

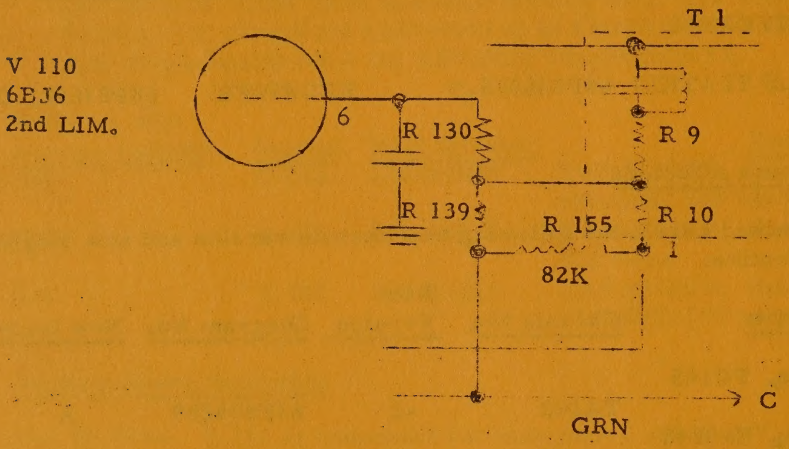
(1) Effective in production 3-31-54.
(2) Authorized by Engineering on PEM #4114, date 3-31-54.

Change Details:

Nature of Change	Ref. Symbol	Part Number	Description
ADD	R 155	6R5644	RESISTOR, fixed: carbon; 82,000 ohm; ±10% 1/2 w; ins.

Supplementary Remarks:

Resistor R 155 is connected between pin 1 of Discriminator Transformer T 1 and the bottom (B+ side) of Resistor R 139 (18K ohm). Refer to partial diagram below for revised circuit details.



Attachments:

None

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THE "RESEARCH" LINE

UNIVERSAL MOBILE TRANSMITTER-RECEIVER MODELS

152-174 MC. 6/12 VDC OPERATION

10 WATTS RF POWER

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3/54

MOTOROLA "RESEARCH" LINE MOBILE MODELS

(This manual is expressly applicable to the following radio set models.)

FRONT MOUNT MODELS

D33G-1	Single-frequency 10 watt transmitter, single-frequency receiver for 60 kc. channel spacing applications.
D33G-2	Two-frequency 10 watt transmitter, single-frequency receiver for 60 kc channel spacing applications.

TRUNK MOUNT MODELS

T33G-1	Single-frequency 10 watt transmitter, single-frequency receiver for 60 kc. channel spacing applications.
T33G-2	Two-frequency 10 watt transmitter, single-frequency receiver for 60 kc. channel spacing applications.

NOTE

An accessory group is normally used in conjunction with each Radio Set listed above. The combination of the Radio Set nomenclature with an applicable accessory group designation will constitute a complete mobile station model.

THE EQUIPMENT DESCRIBED IN THIS MANUAL IS MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING MOTOROLA U.S. PATENTS:

D-159-182
2,408,791
2,434,266
2,438,987
2,524,534
2,547,027
2,583,032
2,607,818
2,637,782
2,654,834
2,130,243
2,408,826
2,439,408
2,459,675
2,547,023
2,560,320
2,596,510
2,608,648
2,642,475
2,662,942
2,343,115
2,409,139
2,439,410
2,472,021
2,547,024
2,566,759
2,598,722
2,608,649
2,650,333
2,398,793
2,421,516
2,439,411
2,486,863
2,547,025
2,572,900
2,602,842
2,626,384
2,652,542
2,404,359
2,434,265
2,439,412
2,524,300
2,547,026
2,576,128
2,602,852
2,636,652
2,652,543

OTHER U.S. PATENTS PENDING

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DESCRIPTION

152-174 MC. MOBILE STATION 10 WATTS RF OUTPUT

1. INTRODUCTION

MOTOROLA "RESEARCH" Line of 152-174 mc. FM radio equipment consists basically of a "radio set" and an associated "accessory group". The "radio set" is comprised of a transmitter, receiver and power supply chassis assembled in a drawer type housing. An "accessory group" includes all associated items required to complete a standard installation of the radio equipment.

"Radio Set" model variations are dependent upon number of operating channels and the type of installation required (front mount or trunk mount). Refer to the "radio set" model chart at the beginning of this manual for a complate listing of the standard "radio sets" available and their respective applications.

Various "accessory groups" are established for use with mobile radio models. The particular combination to be employed will depend upon specific customer requirements. Variations in "accessory groups" are based on primary power source, number of operating channels, type of installation (front mount or trunk mount), and required accessory complement (omission or inclusion of various items).

MOTOROLA FM radio communication equipment provides dependable two-way communications with land and/or mobile stations operating within range on the same specific frequencies.

2. DESIGN

The D33G Series Front Mount Models are designed primarily for under the dash installation.T33G Series Trunk Mount Models are designed for standard vehicular trunk compartment installation. These units provide a transmitter power output of 10 watts and utilize a 10" width mobile housing. D33G and T33G "radio sets" may be operated from either a 6 VDC or 12 VDC primary power source depending only upon the cable kit used with the equipment.

3. EQUIPMENT COMPLEMENT

a. Radio Set

A standard "radio set" model is comprised of the following basic items:

- Transmitter Chassis
- Receiver Chassis
- Power Supply
- Housing
- Sub-Panel and Intercabling Kit
- Front Panel (trunk mount models only)
- Control Panel (front mount models only)
- Transmitter Control Crystal(s)
- Receiver Control Crystal
- Receiver IF Crystal
- Alignment Tool Kit

b. Accessory Group

A standard accessory group includes a specific combination of the following items:

(1) Front Mount Accessories

- Antenna
- Installation Kit
- Cable Kit

(2) Rear Mount Accessories

- Control Head
- Cable Kit
- Installation Kit
- Speaker
- Antenna

4. DESCRIPTION OF RADIO SET ITEMS

a. Transmitter Chassis

MOTOROLA Model TA139 Series Universal Transmitter Chassis are available in one or two channel versions providing a nominal RF output of 10 watts. These transmitters may be used for either 60 kc. or 120kc. channel spacing applications with only an adjustment of the IDC control to meet the specific channel width requirement.

Refer to the TRANSMITTER section for complete specifications and service information relative to the transmitters used with this equipment.

b. **Receiver Chassis**

MOTOROLA Model TA140 Series Universal UNI-CHANNEL receiver chassi are available in either one or two channel versions. With incorporation of different IF wave filters, the same basic receiver chassis is used for either 60 kc. or 120 kc. channel spacing applications. Model nomenclature for different receiver versions is distinguished by unique suffix letters. All mobile stations described in this manual utilize a receiver of the TA140 Series.

Refer to the RECEIVER section of this manual for detailed specifications and service information relative to these receivers.

c. **Power Supplies**

MOTOROLA Model TU212 Series Universal Power Supplies are available in two different model versions accommodating front mount and trunk mount applications respectively. These heavy duty type power supplies provide all operating voltages for the transmitter, receiver and control circuits of the radio combination with which they are used.

The TU212 Series Power Supplies are designed to operate from either a 6 VDC or 12 VDC primary power source depending only upon the cable kit used with the equipment.

Refer to the POWER SUPPLY section of this manual for detailed specifications and service information.

d. **Equipment Housings**

The K-9045 Housing measures approximately 9-5/8" wide by 18" deep by 6" high overall. This housing is used with all Model D33, and T33G Mobile Equipment. The housing is constructed of heavy gauge steel, finished in dark gray automotive type baked enamel. It features a removable cover permitting easy access to the inner drawer unit for added convenience in inspecting and servicing of the equipment.

NOTE

For convenience, the K-9045 Housing will be referred to as the 10" housing.

e. **Front Panels (Trunk Mount Installations Only)**

The K-9029-A Front Panel is employed with the K-9045 "10 inch" housing. This unit is assembled to associated sub-panels to constitute the exterior front panel for the drawer type unit. The panels serve also as the front end covers for the respective mobile housing. A key lock is provided on each panel to lock the drawer units in the housing. A handle is also mounted on the panel for convenience in removing the equipment from the housing and for carrying purposes.

f. Sub-Panel and Intercabling Kits

The TK163 Sub-Panel and Intercabling Kit is employed with the K-9045 "10 inch" Housing. The sub-panels included in this kit are used to assemble the transmitter, receiver and power supply together for installation in the equipment housing. In conjunction with the associated front panel, the assembled combination will constitute the drawer unit for the housing assembly. The antenna interconnect cables and connectors are also included with this kit. Cable receptacles for connection of external cables are assembled to the front sub-panel.

g. Control Panel

The control panel is an integral part of the chassis assembly for front mount Universal UNI-CHANNEL equipment. The panel is physically assembled to the front of the housing and provides all operating facilities for control of the radio assembly. Control panels are available in one or two frequency versions, with and without an attached microphone. "Less Microphone" control panels supplied with this equipment, include a four prong female receptacle for connection of an external microphone or handset (see optional accessories).

Refer to the CONTROL PANEL section of this manual for complete information relative to these control panels.

h. Crystals

The ASL1 Crystal is the primary frequency control element for the universal 10 watt transmitter used with this equipment. The non-heater type crystal is available for operation on any specific frequency within the 152-174 mc. band.

The A17 Crystal is the primary frequency control element for the Universal UNI-CHANNEL receiver used with this equipment. This crystal is available for operation on any specific frequency within the 152-174 mc. band. The G03 is the receiver IF crystal and is of fixed frequency (12.455 mc.). Both receiver crystals are of a non-heater type.

The aforementioned crystals are not part of the transmitter or receiver chassis but are separate items of the overall Radio Set Models. When ordering an individual chassis, crystal type numbers and operating frequency must be specified.

i. Tuning Tool Kit

The K-9321 Tuning Tool Kit includes MOTOROLA Part No. 66A891487 and 66A835721 alignment tools. The 66A891487 Tool is used for transmitter alignment. The 66A835721 Tool is used for alignment of the receiver. Refer to the Alignment Tool Detail 69C801349 for specific dimensions of these alignment tools.

5. DESCRIPTION OF STANDARD ACCESSORIES

a. Control Heads and Microphones

The control head provides the control facilities necessary to manually operate a trunk mount mobile station from a dash board location. Model TA124 and TU203 Series Control Heads are primarily used with Model T33G Radio Sets. Model P-9022 Series Control Heads, may also be used with T33G Radio Sets with only minor revision of "A" power relay cable connections (see installation instructions).

> NOTE
>
> Use of a P-9022 Series Control Head will permit application of the control head and cable installation with either a 10 watt "Universal" model radio set or a previous model 10 watt "Research Line" mobile station.

Refer to the CONTROL HEAD and MICROPHONE section of this instruction manual for various control head models available and related service information regarding these units.

b. Loudspeaker

Standard Trunk Mount Mobile models are suppied with a P-8263-B Firewall Mounting Speaker. This unit includes a 4-1/2" diameter, 3 ohm permanent magnet speaker, mounted in a metal housing. An 8 foot speaker lead is provided for connection to the control head.

Refer to the INSTALLATION and OPERATION section of this manual and to the applicable intercabling diagram for specific installation and connection details.

c. Cable Kits

The cable kit supplied with any accessory group includes the external cables and power fuse(s) necessary for installation of a particular mobile "radio set" model. For Trunk Mount installations, an "A" power relay is also provided with the cable kit. Different types ofcable kits are used with various "radio set" models depending upon the number of frequencies used, primary power source, and the application of the equipment. The standard cable kits available and their respective applications are as follows:

(1)	TK208:	Used with 1-Freq., trunk mount mobile models to operate from a 6.3 VDC power source.
(2)	TK209:	Used with 1-Freq., trunk mount mobile models to operate from a 12.6 VDC power source.

(3) TK161: Used with 2-Freq., trunk mount mobile models to operate from a 6.3 VDC power source.

(4) TK162: Used with 2-Freq., trunk mount mobile models to operate from a 12.6 VDC power source.

(5) TK190: Used with 1 or 2-Freq., front mount mobile models to operate from a 6.3 VDC power source.

(6) TK191: Used with 1 or 2-Freq., front mount mobile models to operate from a 12.6 VDC power source.

d. Installation Kits

The K-9054 Installation Kit is supplied with all model D33G Series front mount mobile equipment. The K-9055 Installation Kit is supplied with T33G trunk mount mobile units. These kits include a noise suppressor, by-pass capacitors, cable clamps and mounting hardware for installation of applicable "radio set" models.

e. Antenna

The P-8553-B Roof Top Antenna includes a quarter wavelength stainless steel rod with associated 14 foot coaxial "lead-in" cable. The unit is expressly designed for standard vehicle roof top installation. The antenna is used with both front and trunk mount mobile equipment. Complete installation and service instructions for this antenna are included in the INSTALLATION AND OPERATION section of this manual.

6. OPTIONAL ACCESSORIES

a. P-8501-A Portable Test Set

The MOTOROLA P-8501-A Portable Test Set is a universal test instrument for alignment of transmitters and receivers. It is engineered specifically for use with MOTOROLA "RESEARCH" Line communication equipment. With the adapter cables supplied, the P-8501-A Test Set may be used to align all MOTOROLA transmitters and receivers.

The test set incorporates a 0-50 microampere 2000 ohm meter which, with the selector switch, provides metering for all transmitter and receiver circuits essential to tuning and checking. Also included in the test set is a crystal oscillator and multiplier. With the aid of an associated transmitter crystal and an applicable IF alignment crystal the test oscillator may be used as a signal source for complete receiver alignment. The test set may also be used as a fie strength meter for measurement of relative transmitter field strength. Other functions which may be performed with the test set are: relative audio measurement, receiver quieting measurement, transmitter filament voltage measurement, and plate voltage measurement.

b. **P-7208 Wattmeter Load**

The P-7208 Wattmeter Load is designed to be used with a P-8501-A Test Set or other 2000 ohm, 0-50 microampere meter to measure RF power output. The unit has a standing wave ratio of less than 1.2 over a frequency range of 25-174 mc. and a nominal impedance of 50 ohms. A calibration chart is supplied for use in correlating power dissipated in the load and the meter reading.

c. **P-346 Generator Filter**

The P-346 Generator Filter is intended for mobile units equipped with VHF receivers to eliminate generator interference. The filter is rated at 40 amperes.

d. **P-8263-A Speaker**

The P-8263-A Speaker is available on special order if desired. It is designed for mounting to the steering column. This speaker is electrically interchangeable with the standard P-8263-B Firewall Mounting Speaker.

e. **K-7257 Extension Cable**

The K-7257 Extension Cable is available for use with 10 watt mobile equipment. This cable may be used to provide a direct ground return from the mobile housing assembly to the vehicular battery. The cable is 17' in length.

f. **TK161-20 and TK162-20 Long Type Cable Kits**

The TK161-20 and TK162-20 Cable Kits are available for trunk mount installations requiring 20' power and control cables instead of the standard 17' length. These cable kits are applicable for limousine or truck type installations. TK161-20 and TK162-20 Long Cable Kits are interchangeable with standard short type 6 VDC or 12 VDC (1 or 2 Freq.) cable kits respectively.

g. **P-7234 Series Cowl Mounted Antenna**

The P-7234 Series Cowl Mounted Antenna is available on special order if desired. The P-7234 Series Antenna may be ordered in either the sectional rod or solid rod styles. Operating frequency must be specified when ordering this type antenna.

h. **P-8377 Antenna**

The MOTOROLA P-8377 is a coaxial dipole type antenna designed for application with mobile stations operating within a 152-162 mc. frequency range. This antenna provides maximum radiation power in the horizontal plane. The antenna is especially suited for bumper or vertical mount installations.

Either of two installation kits are available for mounting the P-8377 Antenna. The K-8354 Installation Kit is designed for bumper mounting; the K-8354-A Installation Kit is designed for mounting the antenna to a vertical flat surface such as the side of a truck cab or similar part of vehicle structure

i. Detachable Microphones and Handset

A P-255-E or P-7255-A Microphone and a P-278-F Handset are available for use with control units incorporating detachable microphone provisions. All models are terminated in a four prong male connector.

The P-255-E is a standard MOTOROLA military type microphone; the P-7255-A is a "noise cancelling" type microphone. Both microphones may be used with standard "radio set" models without any modification to the radio equipment whatsoever. The P-278-F is a conventional type telephone handset. When using the handset with a standard "radio set" model, the shielded input lead to the grid of the 1st IDC amplifier of the transmitter must be connected to the POS. 2 tap of the input divider (see applicable transmitter schematic diagram).

NOTE

If a handset is ordered with a mobile station incorporating detachable microphone provisions, the transmitter input circuit will be wired for handset operation at the factory. If the mobile station is ordered without a handset, the transmitter will be connected for military microphone input. In the latter case, the input circuit will have to be revised in the field to accommodate handset operation.

NOMINAL PERFORMANCE SPECIFICATIONS

MODELS		D33G Series	T33G Series
APPLICATION		Front Mount Mobile	Trunk Mount Mobile
FREQUENCY		152-174 MC.	
TRANSMITTER RF POWER OUTPUT		10 Watts	
TRANSMITTER MODULATION		40F3: ±15 kc. for 100% at 1000 cycles	
RECEIVER 20 DB QUIETING SENSITIVITY		With TU145 Filter (60 kc. channel spacing): less than 0.5 microvolts	
RECEIVER SELECTIVITY		With TU145 Filter: -100 db at ±30 kc.	
RECEIVER MODULATION ACCEPTANCE		With TU145 Filter: ±15 kc. or more at -6 db.	
METERING		Chassis mounted metering sockets on the transmitter and receiver facilitate convenient metering of all circuits essential to tuning and checking. A test unit incorporating a single scale meter and associated rotary selector switches may be used for this purpose.	
PRIMARY INPUT DRAIN (TOTAL)	Input V	6.3 VDC	12.6 VDC
	Standby	10.0 amps.	5.0 amps.
	Transmit	24.0 amps.	12.0 amps.
POWER SUPPLY		Single vibrator type; 6/12 VDC operation	
WEIGHT		54 lbs. installed complete	46 lbs. installed complete
DIMENSIONS		6" high x 9-7/8" wide x 18-1/2" long overall	6" high x 9-7/8" wide x 18-1/4" long overall
FCC LICENSE DESIGNATION		All Models: TA139	

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Motorola®

THE "RESEARCH" LINE

INSTALLATION AND OPERATION
UNIVERSAL MOBILE STATION
152-174 MC. 10 WATT RF OUTPUT

INSTALLATION

1. PRELIMINARY

a. Unpacking and Inspection

Use care when unpacking and handling this radio equipment. Open the shipping carton and carefully remove the individually packaged components. Check contents to be sure all items have been included.

Inspect the equipment thoroughly as soon as possible after delivery. If any part of the equipment has been damaged in transit, report the extent of damage to the transportation company immediately.

b. Pre-Installation Check

This equipment has been accurately adjusted at the factory for optimum performance. However, it is possible that units may have been dropped or otherwise severely mishandled while in transit. Therefore, previous to making the installation, it is recommended that the transmitter and receiver be bench checked for proper meter readings. If these preliminary checks indicate that any of the circuits are out of alignment, the entire unit should be completely re-aligned.

If re-alignment is necessary, refer to the applicable procedure in the TRANSMITTER and RECEIVER section of this manual.

> NOTE
>
> FCC regulations state that when a transmitter is initially installed, a suitable procedure shall be employed to ascertain that the carrier is on the assigned frequency. This frequency check is recommended to be made immediately before the equipment is placed in service. A MOTOROLA F4MU-24B Series Frequency Monitor or equivalent frequency measuring device should be used for this purpose.

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2. MOBILE TRUNK MOUNTING INSTALLATION PROCEDURE

a. Planning the Installation

A typical trunk mount mobile installation is illustrated on Diagram 69D802254. Cabling Details are shown on Diagram 69C831702 and 69C835232.

Before proceeding with the actual installation, a definite layout outlining the exact location for each component of the equipment should be made. Locations should be selected with regards to the following considerations.

(1) Convenient location of the mobile housing assembly: The unit must be well grounded to the vehicle frame. This plan should provide a location for the mobile housing which will permit removal of the chassis from the housing and be as much out of the way for luggage in the trunk as possible.

(2) Convenient location for mounting the antenna: The antenna lead-in must be routed so as to avoid any sharp bends and undue strain at either end connector.

(3) Convenient locations for mounting the speaker control head and microphone or handset.

(4) Convenient route for running interconnecting cables.

(5) Convenient location for fuse block and "A" power relay.

NOTE

> The dual interrupter vibrators employed with these mobile station models, permit standard installation regardless of which terminal of the vehicle battery is grounded.

b. Mobile Housing Installation

The mobile housing may be installed in various positions depending upon the individual application; however, inverted mounting is not recommended. Refer to Dimensional Detail 69B802109 for clearance allowance.

(1) Remove the drawer unit and top cover from the housing.

(2) Knock out the four half-punched mounting holes in the bottom of the housing.

(3) Place the housing in the desired mounting location. The location should be flat and free from projections.

(4) Use the housing as a template or refer to Dimensional Detail 69B802109. Allow a minimum clear space of three inches in front of the housing and center punch the four mounting centers.

(5) Use a #11 (.101") drill to drill the mounting holes. Use caution; the drill must clear the gas tank, wiring and other vital parts.

(6) Mount the housing to the vehicle using the four #14 sheet metal screws supplied in the installation kit.

(7) Replace the drawer unit and housing cover.

c. Mounting Control Head

The control head may be installed in any desired location, preferably on the lower lip of the instrument panel of the vehicle. The unit may be mounted in any of several position as desired.

(1) Pre-Installation Instructions

To facilitate installation, the control head assembly is shipped with the mounting bracket dis-assembled from the control unit. When installing the unit, first mount the bracket and then assemble the control head to the bracket.

Any combination of the five mounting holes provided in the mounting bracket may be utilized for the installation - depending upon the physical configuration, wiring layout, etc. of the instrument panel. When two mounting holes are used (minimum required), the extreme end holes of the bracket should be employed.

(2) Install the Control Head

(a) Select a location for the control head. Use the mounting bracket as a template to determine placement of the four mounting holes. Use a #32 drill and drill four 0.116" diameter holes.

CAUTION

Be sure that all wires are clear of the instrument panel where holes are to be drilled.

(b) Mount the control head mounting bracket with the desired number of #8 sheet metal screws supplied (two screws minimum).

(c) Assemble the control head to the control head mounting bracket. Be sure to place the bakelite washers between the mounting bracket and the control head housing.

(d) Tighten the screws securely.

(3) Pilot Lamp Considerations

All control heads are shipped with 6 volt lamps installed. For 12 volt operation, the GREEN pilot bulb must be replaced with a 12 volt lamp. (Twelve volt lamp supplied with applicable twelve volt cable kit.) Replace GREEN lamp only.

d. Mounting Microphone Bracket

(1) Select a location for the microphone and drill two holes 0.116" in diameter (#32 drill), 1/2" apart, or use the bracket as a template.

(2) Fasten the bracket with the two #8 self-tapping screws.

NOTE

If a handset is used, use the hang-up bracket as a template, drill holes with #32 drill, and mount with the hardware supplied.

e. Mounting Speaker

(1) Select a location on the firewall for mounting the speaker, making sure there are no obstructions on either side of the firewall.

(2) Drill a 1/2" mounting hole.

(3) Assemble the mounting bracket to the back of the speaker housing, using the two screws securely.

(4) Place the speaker mounting stud through the mounting hole and rotate the speaker to the desired position before tightening the mounting stud.

(5) Place the large flat washer, lockwasher and nut on the mounting stud.

(6) Using a 3/4" wrench, tighten the mounting nut securely making sure the speaker mounting bracket ears are forced into the firewall covering to prevent the speaker from turning.

For information concerning other types of speakers, refer to the instructions supplied with the units.

f. Fuse Block Assembly and "A" Power Relay Mounting

The fuse block assembly and the "A" power relay are mounted on the engine side of the firewall or on the fender panel. The fuse block must be within 24 inch cable length of the battery or hot connection on starter relay.

In installations where the fuse block may be exposed to severe weather conditions inside the engine compartment, it is recommended that the fuse block and "A" relay be mounted on the dash side of the firewall.

(1) Fuse Block Assembly Mounting

(a) Select the desired location for the fuse block assembly.

(b) Use the Fuse Block as a template and center punch 2 mounting centers.

(c) Drill two 0.128" diameter mounting holes using a #30 twist drill.

(d) Mount the fuse block assembly to the fender panel or firewall with the 2 #10-16 x 3/4" sheet metal screws supplied.

(2) Installation of "A" Power Relay

Install the relay within three feet of the fuse block. Position the relay so that the mounting brackets are "up" and the terminals are "down".

(a) Use the mounting holes in the relay mounting bracket as a template and drill two 0.185" mounting holes with a #13 drill.

(b) Fasten the relay securely using the two #14 sheet metal screws supplied.

g. Intercabling

(1) Refer to the following diagrams for reference details relative to various rear mount mobile station installations.

(a) Mobile station installation using TU124 or TU203 Series Control Head:

Cabling Detail - 69C831702
Intercabling Diagram - 63E836076

(b) Mobile station installation using P-9022 Series Control Head:

Cabling Detail - 69C835232
Intercabling Diagram - 63E836078

(2) Connect the power and control cable connector into the receptacle on the front of the mobile housing assembly.

(3) Route the multi-conductor control cable thru the forward wall of the trunk and along either side of the vehicle so that the pin tip ends of the control cable reach to the terminal board on the rear of the control head. The cable may be routed under the floor mat along the side of the center drive shaft well if desired.

Protect the cable with rubber grommets or electrical tape at the points where it may be necessary to run the cable thru holes in the car frame or over steel seat guides.

(4) Secure the control cable clamp to the plate on the rear of the control cable clamp to the plate on the rear of the control head by means of the "S" hook on the cable.

(5) Insert the control cable pin tab connectors into the corresponding receptacles on the rear of the control head.

(6) Ground the control cable shield lead under the control head assembly screw adjacent to receptacle #33 on the rear of the control head.

(7) Clamp the control cable down wherever necessary with the cable clamps and hardware supplied. Pull any excess cable into the trunk compartment before tightening the cable clamps.

(8) Connect the speaker leads to the SPKR receptacles on the rear of the control head.

(9) Route the BLK Power Cable from the mobile housing power plug to the "A" power relay.

(a) Interior Routing

The Power Cable is preferably routed through the interior of the vehicle along with the control cable, thus eliminating the necessity of weatherproofing the cable. In such installations a hole may have to be drilled in the firewall permitting routing of the power cable to the "A" power relay.

(b) Exterior Routing

The Power Cable may be routed under the vehicle if desired. However, in such installations weatherproofing will be required. To route cable beneath vehicle proceed as follows:

1. Drill a hole in the floor of the trunk large enough to accommodate the power cable.

CAUTION

Placement of this hole should be clear of the vehicle fuel tank.

2. Route the weatherproofed cable through the hole in the trunk and along the frame of the vehicle to the "A" power relay. Cables routed under the vehicle should employ "flexible loom" or other suitable protection.

3. Seal the hole around the protected cable with a rubber grommet or by other means in order to prevent water seepage into the trunk.

(10) Make fuse and "A" power relay connections.

(a) Mobile station installation using TU124 or TU203 Series Control Head:

1. Connect the 17' BLK Power Cable to the "H" terminal of the "A" power relay.

2. Connect one end of the 3' BLK Power Cable to the fuse block and the other end to the "B" terminal of the "A" power relay.

3. Connect the 4" BLK jumper from the "B" terminal to one of the "S" terminals of the "A" power relay.

4. Connect the lug end of the GRN Power On-Off Cable to the "H" terminal of the "A" power relay. Connect the lug end of the GRN-WHT cable to the vacant "S" terminal of the "A" power relay.

5. Route the GRN and the GRN-WHT Power On-Off Cables from the "A" power relay to the control head. These cables should be routed through the firewall panel in as convenient and direct a manner as possible.

6. Insert the pin tip connectors on the ends of the GRN and GRN-WHT Cables into the #6 and #5 pin receptacles respectively on the control head terminal board.

(b) Mobile station installation using P-9022 Series Control Head:

1. Connect the 17' BLK Power Cable to the "H" terminal of the "A" power relay.

2. Connect one end of the 3' BLK power cable to the fuse block and the other end to the "B" terminal of the "A" power relay.

3. Connect the 4" BLK jumper from one of the "S" terminals of the "A" power relay to ground.

4. Connect the lug end of the GRN power on-off cable to the vacant "S" terminal of the "A" power relay. Connect the lug end of the GRN-WHT cable to the "B" terminal of the "A" power relay.

5. Route the GRN and the GRN-WHT power on-off cables from the "A" power relay to the control head. These cables should be routed through the firewall panel in as convenient and direct a manner as possible.

6. Insert the pin tip connectors on the ends of the GRN and GRN-WHT cables into the #6 and #5 pin receptacles respectively on the control head terminal board.

(11) Ground the 4' ground cable from the mobile housing power plug to the chassis frame (utilize convenient frame bolt).

IMPORTANT

A secure ground connection to the vehicle frame is required for proper operation. DO NOT connect ground cable to vehicle body.

NOTE

A K-7257-17' Ground Extension Cable is available on separate order. This cable is installed between the 4' ground cable from the power plug and the retaining bolt of the ground cable connector on the battery ground terminal. The 4' ground cable should be assembled to the extension cable with a bolt and nut connection. This ground return extension cable to the battery is recommended for use in over-age vehicles in whch excessive voltage drops are encountered.

(12) Connect the BLK battery cable from the open end of the fuse block to the unground (hot) side of the battery or starter solenoid terminal. Fasten the cable lug beneath the nut on the battery clamp or starter solenoid terminal.

(13) Fasten down all cables wherever necessary with cable clamps and hardware supplied. Pull all cable excess into the trunk compartment before tightening cable clamps.

h. Antenna and Suppressor Installation

Install the antenna and noise suppression components as described in paragraphs 4 and 5 of this section.

3. MOBILE FRONT MOUNTING INSTALLATION PROCEDURE

a. Planning the Installation

A typical front mount mobile installation is illustrated in Diagram 69D800203.

Before proceeding with the actual installation, a definite layout outlining the exact location for each unit of the equipment should be made. Locations should be selected with regards to the following considerations.

(1) Convenient location for the mobile housing: Unit must be well grounded to vehicle body or frame. This plan should provide a location for the mobile housing which will permit the removal of the chassis from the housing, and which will be as much out of the way as possible for all vehicle occupants.

(2) Convenient location for mounting the antenna: The antenna lead-in must be routed so as to avoid any sharp bends and undue strain at either end connector.

(3) Convenient route for running interconnecting cables.

(4) Convenient location for the fuse block.

b. Housing Installation

The front mount mobile housing may be installed in any position. To mount the housing, proceed as follows:

(1) Remove the chassis assembly and the top cover from the housing.

(2) Assemble the mounting bracket assembly to the housing as shown in Diagram 69D800203. The mounting bracket side channels should not be tightened until the installation has been definitely decided upon. The rear mounting bracket can be rotated 200 degrees, thus permitting the rear bracket to be mounted in the most desirable location.

(3) Rotate the U-shaped hanger brackets to the desired angle for flush mounting to the most suitable surface. The U-shaped bracket is riveted to the side brackets and with slight pressure, it may be rotated.

(4) Use any two of the four mounting holes in the bracket and the two short sheet metal screws and lockwashers to fasten the front bracket. The #14 screws require a 0.189" mounting hole (#12 drill).

(5) Use the two long #14 sheet metal screws and lockwashers to fasten the rear mounting bracket.

(6) Replace the housing top cover and tighten the mounting screws and side channel screws securely.

c. Microphone Bracket Installation

(1) Determine the location of the microphone and drill two holes 0.116" in diameter (#32 drill), 1/2" apart or use the bracket as a template.

(2) Fasten the bracket with the two #8 sheet metal screws.

NOTE

If a handset is used, use the hang-up bracket as a template, drill holes, and mount with the supplied hardware.

d. Fuse Block Installation

The fuse block is mounted on the engine side of the firewall or on the fender panel. The fuse block must be within 24 inches of the battery. In installations where the fuse block is exposed to severe weather conditions, it is recommended that it be mounted on the dash side of the firewall.

(1) Select the desired location for the fuse block assembly.

(2) Use the contact plate of the assembly as a template and center punch two mounting centers.

(3) Drill two .136" diameter mounting holes using #29 drill.

(4) Mount the fuse block assembly to the firewall or fender panel with the two #10 sheet metal screws.

e. Intercabling

Refer to Intercabling Diagram 63E836077.

(1) Route the power cable through the firewall.

(a) Connect the three foot cable to a convenient ground.

IMPORTANT

A secure ground connection to the vehicle frame is required for proper operation.

(b) Connect the six and one-half foot cable to the fuse block.

(2) Connect the two foot cable between the fuse block and the ungrounded battery terminal.

f. Antenna and Suppressor Installation

Install the antenna and noise suppression components as described in paragraphs 4 and 5 of this section.

4. MOBILE STATION ANTENNA INSTALLATION

The P-8553-B Roof Top Antenna is designed for operation in the 152-174 megacycle range. It is single hole mounted with a coaxial lead-in cable concealed between the head lining and the roof top. It can be mounted from the exterior of the car without damaging the interior lining.

(1) Select a location for the antenna as near the center of the roof as possible which will permit the coaxial lead-in cable to run diagonally from the antenna to either the left or right side of the vehicle without obstruction. The side lining may be pressed up with the fingers to make certain that all points of obstruction will be avoided.

NOTE

Cable routing will vary depending upon the type of vehicle and specific installation (front or rear mount). For front mount installation, the antenna cable is best routed down the side of the window column or along the path of other vehicle interior wiring. For rear mount installations, the cable should be routed down the rear side wall of the vehicle to the trunk compartment.

(2) After locating the desired position for the antenna, drill a 3/4" hole.

CAUTION

Use a lip or saw drill. DO NOT USE A STANDARD TWIST DRILL. Be careful not to tear the head lining. Clean the paint off the top of the car roof about 1/16" around the hole.

(3) The antenna cable should first be routed from the mobile housing assembly to one of the vehicle side windows. For front mount installations, remove the trim from the right or left front window. For trunk mount installations, remove the trim from the right or left rear window. Loosen the upholstery enough to permit fishing the cable from the mobile housing up to the window with an electricians fish tape. Pull enough cable up to the window to permit it to be routed to the mounting hole without requiring it to be pulled all the way from the mobile housing. AVOID ALL SHARP BENDS IN THE CABLE DURING BOTH THIS PROCEDURE AND IN SUBSEQUENT ROUTING.

(4) Route the cable over the top of the window and over to the mounting hole.

(5) Prepare the cable for connection to the antenna by stripping off 1-1/8" of the outer cover, 13/16" of the shield braid, and 1/2" of the insulation. Refer to Diagram 69C481038.

(6) Remove the plug button (13).

(7) Place the rubber sleeve over the cable and feed the cable through the stem on the bushing (12) so the shield braid is on the outside of the stem.

CAUTION

Do not disassemble the antenna at this time.

(8) Solder the lead to the eyelet (7) and replace the plug button (13). Solder the shield braid to the stem. It is suggested that the soldering be done in three or four steps around the stem, allowing time for cooling between operations. Do not overheat and melt the cable insulation.

(9) Pull the rubber sleeve over the stem so that about 1/4" is still over the outer cover of the cable.

(10) Remove the following parts from the antenna: ferrule (2), lead washer (3), insulator (4), rubber washer (5), insulator (6), rod (1), bushing (9), gasket (10), and "C" washer (11).

(11) Place the installation wire, packed with the antenna, through the two holes in the bushing (12), press the wire flat against the outside flat on the bushing, and place bushing (12) through the hole in the roof of the vehicle. Hold the bushing near the top of the hole with the wire.

(12) Feed the "C" washer (11) through the hole and on the bushing (12). Pul the assembly up through the hole with the wire.

(13) Place the gasket (10) in position with the open side of the gasket toward the roof of the car.

(14) Thread upper bushing (9) onto lower bushing (12) as far as possible by hand. Insert antenna wrench across slots on top edges of lower bushing (12). Keeping the lower bushing (12) from rotating by means of the antenna wrench, tighten upper bushing (9) securely. The bushing (9) should be tightened down as far as possible to prevent rain leakage into vehicle.

NOTE

A small amount of lacquer, glyptal, or varnish on the threads of bushing (9) before threading on bushing (12) is recommended. The same will apply to the threads between bushing (9) and ferrule (2) (step 16).

(15) Remove wire from bushing.

(16) Install the rod (1), and parts attached to the rod, and tighten ferrule (2) holding bushing (9).

(17) Place the antenna ferrule cover (16) over the outside of antenna as shown on drawing 69C481038.

(18) Pull all the excess cable back over the window to the front. AVOID ALL SHARP BENDS IN THE CABLE.

(19) Replace the window trim.

(20) Connect the coaxial cable to the lead-in connector on the equipment.

SUGGESTION:

Brush lacquer, glyptal or varnish around the mounting hole to prevent rusting of roof top in case the paint was scraped beyond the diameter of the gasket.

5. MOBILE STATION SUPPRESSOR INSTALLATION

Two by-pass capacitors and a distributor suppressor are supplied in the installation kit. The use of these items will depend upon the particular vehicle. Refer to paragraph 3 of the OPERATION section ("NOISE CONSIDERATION IN MOBILE EQUIPMENT") for further details.

(1) Disconnect the lead between the coil and the distributor center terminals.

(2) Cut the lead approximately one and one-half inches from the distributor end of the lead, For best operation the suppressor should be installed as close to the distributor as possible.

(3) Screw the suppressor into the cut ends of the lead.

(4) Reconnect the lead.

(5) Remove the generator ground lead screws.

(6) Place the by-pass capacitor on the ground lead screw and replace the screw.

(7) Connect the capacitor lead to the generator armature terminal. DO NOT CONNECT THE LEAD TO THE FIELD TERMINAL.

(8) Use the second capacitor to by-pass other electrically "noisy" equipment.

OPERATION

1. PRE-OPERATIONAL CHECKS AND ADJUSTMENTS

Before placing this station in operation, the following checks and adjustments should be made:

a. General

Check all lugs, cable connections, fuses, and bolted connections. Be sure all tubes are firmly in their sockets and tube connectors secure.

b. Power

(1) Turn the VOLUME control on the control head clockwise. A "click" will be heard when the power switch is actuated.

(2) Check to be sure that the green indicator on the control head, (or control panel) and the transmitter receiver filaments are illuminated.

c. Transmitters

(1) Check the transmitter input circuit for the specific audio input connections required for the station; i.e., microphone or handset input. Refer to the "Audio Sensitivity Adjustment" paragraph in the applicable TRANSMITTER section of this manual for connection details.

(2) Load the transmitter to the antenna as described in the TRANSMITTER section of this manual.

(3) Check the transmitter for proper operating efficiency. Refer to the alignment procedure and meter readings detailed in the TRANSMITTER section of this manual.

d. Receivers

Recheck alignment of the receiver as outlined in the RECEIVER section of this manual.

2. OPERATIONAL PROCEDURE

a. To Turn "ON" Equipment

Turn the VOLUME control clockwise. A click will be heard when the switch is actuated and the green indicator lamp will become illuminated. The receiver is now in full operation and the transmitter filaments are "on".

NOTE

If multi-channel transmitter and/or receiver is used, place frequency selector switch in desired frequency position.

b. To Receive:

(1) Turn the VOLUME control to the full clockwise position.

(2) Turn the SQUELCH control to the full counterclockwise position.

(3) Adjust the SQUELCH control, by turning the control slowly clockwise until the noise is just squelched (cuts out). Turning the control beyond this point will increase the minimum signal necessary to open the squelch circuit.

(4) Set the control head VOLUME control to the desired speaker level with a received signal.

c. To Transmit:

(1) Remove the microphone from the hanger bracket and press the push-to-talk button. The red indicator lamp will become illuminated, indicating the transmitter is "on". If a military or noise cancelling type microphone is used, hold the microphone at approximately a 30° angle from the lips and speak clearly and distinctly across the microphone in a normal or loud voice. If a handset microphone is used, speak directly into the mouthpiece of the handset. THIS TRANSMITTER CANNOT BE OVER-MODULATED BY SPEAKING LOUDLY

(2) To receive reply, release the push-to-talk button. The red indicator lamp will go "off" indicating that the transmitter circuits are no longer energized. The received reply may now be heard over the speaker and/or the handset earpiece (if used).

(3) When the transmission is completed release the push-to-talk button and hang the microphone in the hanger bracket.

d. To Turn "OFF" the Equipment:

Turn the VOLUME control counterclockwise. A click will be heard when the switch is actuated and the green indicator lamp will go "off".

3. NOISE CONSIDERATION IN MOBILE EQUIPMENT

One of the inherent characteristics of frequency modulation is its ability to reduce noise in the presence of a received carrier. To obtain this noise reduction, it is necessary that the receiver be tuned exactly to the received carrier. It is assumed that this tuning operation has been completed and so the procedure need not be repeated.

Interfering noise may be of a local nature produced by sparking motors, fluorescent lights, and other electrical devices. Interference may also occur from industrial induction or dielectric units in nearby plants.

Electric fences will sometimes radiate interference three or four miles; this type of interference is characterized by an intermittent buzzing noise. Nearby automobiles will also radiate interference. All the aforementioned noise sources are of a local nature and may be drawn away from in a mobile installation.

In a mobile installation, the vehicle's electrical system must be given a thorough check so as to limit the production of electrical interference. The level of interference created by the vehicle in which the equipment is installed will be the limiting level for satisfactory reception. Care must be taken to reduce this interference to the lowest possible level.

Generator noise can be detected by coasting the car in gear, with the ignition off. The installation of a shielded by—pass capacitor (MOTOROLA Part Number 8A821889) to the generator output terminal will usually eliminate the generator noise. The P-346 high frequency generator filter is available on separate order, if required. Installation of spark plug suppressors (MOTOROLA Part Number 6X16621) and distributor suppressor (MOTOROLA Part Number 6A4141) will usually reduce ignition interference to a satisfactory level.

Totally shielded by-pass capacitors (MOTOROLA Part Number 8A821889) can be tried at various points in the electrical system, such as the generator voltage regulator, ignition switch or gauges. CAUTION: Do not connect capacitor across generator field.

Adding extra bonding strips from the motor block to the frame of the vehicle will sometimes reduce interference. It may also be helpful to bond the exhaust pipe and muffler to the frame of the vehicle.

There is no "sure cure" for ignition interference. It may be necessary to try various methods before the interfering radiation is located and corrected. A successful method for one installation may not be satisfactory in all installations.

4. MAINTENANCE OF MOBILE EQUIPMENT

a. Terminal Connections

Battery and generator connections must be clean and tight at all times to prevent power losses due to excessive voltage drops across loose connections. Check weekly.

b. Fuses

Fuses must fit snugly in the fuse holders to prevent voltage drops at these points. Check weekly.

c. Battery Charge

The vehicle battery should be checked weekly to be sure that it is properly charged. A specific gravity measurement is recommended for this purpose. The reading obtained should be in agreement with the normal operating specifications stipulated by the battery manufacturer.

d. Power Input Cables

Power cable connections may be checked by measuring the overall voltage drop from the battery to the equipment. With the transmitter "on" and the vehicle motor running, the voltage drop from the ground cable of the radio equipment to the battery ground terminal should be negligible. The voltage drop in the power cable from the (hot) battery terminal to the equipment should not exceed 0.6 volts (6 volt models) or 1.2 volts (12 volt models). Cable voltage drop will be the difference between the voltage reading obtained from the battery terminal to ground and the reading obtained from a "voltage input measuring point" on the mobile equipment to ground. A convenient "voltage input measuring point" is pin #19 on the input receptacle of the power supply. The drawer assembly must be partially pulled out of the mobile housing to permit access to "voltage input measuring point".

e. Vehicle Generator and Voltage Regulator

Routine maintenance checks should be made on the vehicle generator and voltage regulator to insure proper operation of the radio equipment. Periodic maintenance should include:

(1) Checks of generator brush condition and replacement if necessary.

(2) Checks of generator armature condition.

(3) Check of generator output and voltage regulator setting. This setting should conform to either the car manufacturer's or the generator manufacturer's recommendations.

(4) Check of generator lubrication and re-lubricate if required.

5. SCHEMATIC DIAGRAM PARTS LIST

NOTE

The following Parts Lists are arranged by kits. When ordering replacement parts specify part number, description, schematic diagram number, diagram issue and reference symbol of part.

a. Model D33G Series Mobile Station

Reference:
Intercabling Diagram
63E836077

(1) TK190 Cable Kit (6 Volt) TK191 Cable Kit (12 Volt)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		FUSE,
F 1	65K830314	Cartridge: one time; paper; 40 ampere; 250 volt; 3" lg. x 13/16" dia.; used only in Model TK190
	or 65K52482	Cartridge: one time; paper; 20 ampere; 250 volt; 2" lg. x 9/16" dia.; used only in Model TK191
		CONNECTOR,
P 1	9B834756	Plug: female; 6 contact; polarized; rectangular molded black phenolic base; includes SHELL, connector, cable mounted; used in Models TK190, TK191
		LEAD,
W 1	1V835443	Electrical: used only in Model TK190; includes: 30A16396 CABLE, power: single conductor; #8 ga. stranded; rubber insulated; black cotton outer wrap; 24" length required 29K824454 CONNECTOR, terminal: closed end for 5/16" dia. stud; other end for #8 lead 29K835302 CONNECTOR, terminal: closed end for 1/4" dia. stud; other end for #8 lead
	or 1V835445	Electrical: used only on Model TK191; includes: 30A16396 CABLE, power: single conductor; #8 ga. stranded; rubber insulated; black cotton outer wrap; 24" length required

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		29K824454 CONNECTOR, terminal; closed end for 5/16" dia. stud; other end for #8 lead 29K824434 CONNECTOR, terminal: closed end for #10 dia. stud; other end for #8 lead
		FUSEHOLDER,
XF 1	67B83859	Single fuse mounting; rectangular ceramic base; chassis mounted; for 3" long x 13/16" diameter fuse; used only in Model TK190
	or 67K892616	Single fuse mounting; rectangular porcelain base; chassis mounted; for 2" long x 9/16" dia. fuse; used only in Model TK191

(2) TK163 Sub-Panel and Intercabling Kit

		CONNECTORS,
P 101	28K474006	Plug: male; single contact; round bakelite wafer insulator; cable mounted; connects to Receiver Antenna Coil Connector; p/o W 101
P 102		Same as P 101 except connects to Transmitter Receiver Relay Connector; p/o W 101
		LINE,
W 101	1K800193	RF, transmission: coaxial; Transmitter Relay Receiver Connector to Receiver Antenna Coil Connector; includes: 30K475378 CABLE, RF: coaxial; RG-58A/U; 22" length required Includes reference parts P 101 and P 102

b. Model T33G Mobile Stations

Reference:
Intercabling Diagrams
63E836076
63E836078

(1) TK208 Cable Kit (1-Freq., 6 Volt)
TK161 Cable Kit (2-Freq., 6 Volt)
TK209 Cable Kit (1-Freq., 12 Volt)
TK162 Cable Kit (2-Freq., 12 Volt)

		FUSES,
F 1	65K52281	Cartridge: one time; glass; 1 ampere;

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		250 volt; 1-1/4" long x 1/4" dia.; p/o W 2
F 2	65K830314	Cartridge: one time;paper ;40 ampere; 250 volt; 3" lg. x 13/16" dia.; used only on TK208 and TK161
	or 65K52482	Cartridge: one time; paper; 20 ampere; 250 volt; 2" long x 9/16" dia.; used only on TK209 and TK162
		RELAY,
K 1	59B880283	Armature: 6 VDC; contact arrangement; 1 form "A"; used only on TK208 and TK161
	or 59K813674	Armature: 12 VDC; contact arrangement, 1 form "A"; used only on TK209 and TK162
		CONNECTOR,
P 1	9C801050	Plug: female; 19 contact; polarized; rectangular; molded; mica filled phenolic base; cable mounted; connects to Power Supply; does not include the following component parts which must be ordered separately: 15B800676 SHELL, connector 15B800674 COVER, connector shell 14A800673 INSULATOR, connector shell; small 14B800678 INSULATOR, connector shell; large 42A800667 CLAMP, cable 42A800669 CLAMP, cable 4A11722 WASHER, "C" 4A800671 WASHER 3B800681 SCREW, connector retaining; 1 required 3S7209 SCREW, 6-32 x 1/8; 2 required 3S7362 SCREW, 6-32 x 1/2; 2 required
		CABLE ASSEMBLIES,
W 1	1V836537	Special purpose: Power Supply to Control Head; used only on TK208; includes: 30B830032 CABLE, special purpose: 12 conductor; 17 ft. length req'd.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		29K890418 CONNECTOR, plug: male; single contact; pin type; cable mounted; coded #18
		29K890419 Same as 29K890418 except coded #19
		29K890420 Same as 29K890418 except coded #20
		29K890421 Same as 29K890418 except coded #21
		29K890422 Same as 29K890418 except coded #22
		29K890427 Same as 29K890418 except coded #27
		29K890428 Same as 29K890418 except coded #28
		29K890429 Same as 29K890418 except coded #29
		29K890432 Same as 29K890418 except coded #32
		29K835340 Same as 29K890418 except coded #52
		Reference parts P 1 and W 3 (1V831618)
	or 1V831617	Special purpose: Power Supply to Control Head; used only on TK161; includes:
		30B830032 CABLE, special purpose: 12 conductor; 17 ft. length required
		29K890418 CONNECTOR, plug: male; single contact; pin type; cable mounted; coded #18
		29K890419 Same as 29K890418 except coded #19
		29K890420 Same as 29K890418 except coded #20
		29K890421 Same as 29K890418 except coded #21
		29K890422 Same as 29K890418 except coded #22
		29K890427 Same as 29K890418 except coded #27
		29K890428 Same as 29K890418 except coded #28
		29K890429 Same as 29K890418 except coded #29
		29K890430 Same as 29K890418 except coded #30
		29K890432 Same as 29K890418 except coded #32
		29K890433 Same as 29K890418 except coded #33

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		29K835340 Same as 29K890418 except coded #52
		Reference parts P 1 and W 3 (1V831618)
	or 1V836538	Special purpose: Power Supply to Control Head; used only on TK209; includes:
		30B830032 CABLE, special purpose: 12 conductor; 17 ft. length required
		29K890418 CONNECTOR, plug: male; single contact; pin type; cable mounted; coded #18
		29K890419 Same as 29K890418 except coded #19
		29K890420 Same as 29K890418 except coded #20
		29K890421 Same as 29K890418 except coded #21
		29K890422 Same as 29K890418 except coded #22
		29K890427 Same as 29K890418 except coded #27
		29K890428 Same as 29K890418 except coded #28
		29K890429 Same as 29K890418 except coded #29
		29K890432 Same as 29K890418 except coded #32
		29K835340 Same as 29K890418 except coded #52
		Reference parts P 1 and W 3 (1V832062)
	or 1V832061	Special purpose: Power Supply to Control Head; used only on TK162; includes:
		30B830032 CABLE, special purpose: 12 conductor; 17 ft. length required
		29K890418 CONNECTOR, plug: male; single contact; pin type; cable mounted; coded #18
		29K890419 Same as 29K890418 except coded #19
		29K890420 Same as 29K890418 except coded #20
		29K890421 Same as 29K890418 except coded #21
		29K890422 Same as 29K890418 except coded #22
		29K890427 Same as 29K890418 except coded #27

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		29K890428 Same as 29K890418 except coded #28 29K890429 Same as 29K890418 except coded #29 29K890430 Same as 29K890418 except coded #30 29K890432 Same as 29K890418 except coded #32 29K890433 Same as 29K890418 except coded #33 29K835340 Same as 29K890418 except coded #52 Reference parts P 1 and W 3 (1V832062)
W 2	1V831623	Special purpose: Relay to Control Head; used on all cable kits; includes: 10M488285 WIRE, electrical: #20 ga. stranded; insulated; coded GRN-WHT; 50" length required 29K890405 CONNECTOR, plug: male; single contact; pin type; cable mounted; coded #5 29K890406 Same as 29K890405 except coded #6 Reference parts F 1 and XF 1
W 3	1V831618	Special purpose: Relay to Power Supply; p/o W 1 (1V831617); used only on TK208 and TK161; includes: 30K825602 CABLE, power: single conductor; #6 ga. stranded; insulated; coded BLACK; one 17 ft. and one 4 ft. length required
	or 1V832062	Special purpose: Relay to Power Supply; p/o W 1 (1V832061) used only on TK209 and TK162; includes: 30K831572 CABLE, power: single conductor; #10 ga. stranded; insulated; coded BLK; one 17 ft. and one 4 ft. length required
W 4	1V831622	Special purpose: Fuse to Relay; used only on TK208 and TK161; includes: 30K825602 CABLE, power: single conductor; #6 ga. stranded; insulated; coded BLK.; 3 ft. length required
	or 1V832065	Special purpose: Fuse to Relay; used only on TK209 and TK162; includes: 30K831572 CABLE, power: single conductor; #10 ga. stranded; insulated; coded BLK., 3 ft. length required

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CABLE ASSEMBLIES,
W 5	1V831619	Special purpose: Battery to Fuse; used only on TK208 and TK161; includes: 30K825602 CABLE, power: single conductor; #6 ga. stranded; insulated; coded BLK.; 2 ft. length required
	or 1V832063	Special purpose: Battery to Resistor; used only on TK209 and TK162; includes: 30K831572 CABLE, power: single conductor; #10 ga. stranded; insulated; coded BLK., 2 ft. length required
W 6		NOT USED
		LEAD,
W 7	1V831077	Electrical: Relay Jumper; includes Wire, electrical: single conductor; #12 ga. stranded; insulated; coded BLK., 4" length required
		FUSEHOLDERS,
XF 1	9K830037	Cable mounted: male and female retainer; single fuse mounting; 50" long overall including #18 ga. stranded; insulated; coded GREEN leads on both ends of Fuseholder; for 1-1/4" long x 1/4" dia. fuse; p/o W 3
XF 2	67B83859	Chassis mounted: clip type; single fuse mounting; porcelain base; for 3" long x 13/16" diameter fuse; used only on TK208 and TK161
	or 67K892616	Chassis mounted: clip type; single fuse mounting; porcelain base; for 2" long x 9/16" diameter fuses; used only on TK209 and TK162

NON-REFERENCED PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		KIT,
	1V835805	Bulb: supplied only with TK209 or TK162 Cable Kit; includes: 65A84419 LAMP, incandescent: 12-16V; 2 ampere;miniature single contact bayonet base; tubular glass 56A835806 ENVELOPE: includes printed on instructions (Used in 12 volt installation only for GRN. "Power ON" indicator. To be

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		installed in the Control Head at time of installation).
(2) TK163 Sub-Panel & Intercabling Kit		
		CONNECTORS,
P 101	28K474006	Plug: male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Receiver Antenna Coil Connector; p/o W 101
P 102		Same as P 101 except connects to Transmitter Relay Receiver Connector; p/o W 101
		LINE, RF:
W 101	1K800193	Transmission: coaxial; Transmitter Relay Receiver Connector to Receiver Antenna Coil Connector; includes: 30K475378 CABLE, RF: coaxial; RG-58A/U; 22" length required Reference parts P 101 and P 102
(3) K-9029-A Front Panel Kit (Rear Mtg.)		
		CONNECTORS,
P 201	9A85615	Plug: female; single contact; cylindrical; molded round mica filled bakelite insulator; square metal mounting base; cable mounted; does not include 15A483599 SHELL, connector; which must be ordered separately; connects to Front Panel Antenna Connector; p/o W 201
P 202	28K474006	Plug: male; single contact; cylindrical; round bakelite wafer insulator; cable mounted; connects to Transmitter Relay Antenna Connector; p/o W 201
		LINE, RF:
W 201	1V813547	Transmission: coaxial; Transmitter Relay Antenna Connector to Front Panel Antenna Connector; includes: 30K475378 CABLE, RF: coaxial; RG-58A/U; 5-1/2" length req'd. Reference parts P 201 and P 202

(4) P-8263-B Speaker (Fire Wall Mtg.)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		SPEAKER,
LS 301	50B475501	Magnetic: 3.2 ohms impedance; 4-1/2" p/o W 301
		CONNECTORS,
P 301	29K5407	Plug: male; single contact; pin type; round molded; phenolic base; coded WHT-IVORY; cable mounted; p/o W 301; connects to control head
P 302	29K5405	Male; single contact; pin type; round molded phenolic base; coded BLK.; cable mounted; p/o W 301; connects to control head
		CABLE ASSEMBLY,
W 301	1V82217	Special purpose: Speaker to Control Head; includes: 30A76858 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required or 30K77108 CABLE, special purpose; 2 conductor; rubber covered; 8 ft. length required Reference parts P 301 and P 302

6. ANTENNA INSTALLATION DETAIL PARTS LIST

P-8553-B Roof Top Antenna, Single Hole Mounting (152-174 mc.)

Reference:
Schematic Diagram
69C481038

1	47A474915	ROD, antenna
2	43A480576	FERRULE, antenna
3	4A474911	WASHER, lead
4	14A480572	INSULATOR, antenna, top
5	4A480571	WASHER, rubber
6	14A480568	INSULATOR, antenna: .052 I.D.
7	5A47421	EYELET, special
8	14K480569	INSULATOR, antenna: .093 I.D.
9	43A480573	BUSHING, outer: antenna
10	32A474917	GASKET, copper asbestos
11	4A474901	WASHER, "C"
12	43K480557	BUSHING, antenna and support

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
13	38A474919	BUTTON, plug
14	37K51105	SLEEVE, rubber
15	1X475057	CABLE and CONNECTOR ASSEMBLY: consisting of: 14 Ft. 30A102422 CABLE: coaxial RG-58/U 1 28A85558 CONNECTOR, plug: male; single contact
16	15A475299	COVER, antenna ferrule
17	66A480578	WRENCH, antenna: .078 thick x 11/32 wide x 4" long
	10M519	WIRE: #24 solid, tinned copper; bare; INSTALLATION

NOTE

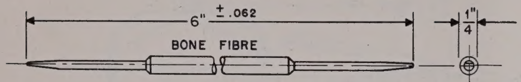
Items No. 1, 4, 5 and 6 may be purchased as a complete ANTENNA ROD ASSEMBLY by ordering MOTOROLA Part # 1K480559.

IMPORTANT

Frequency must be specified when ordering.

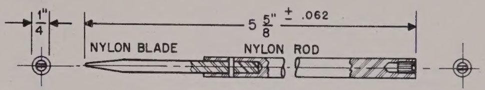
MOTOROLA
RESEARCH LINE EQUIPMENT
ALIGNMENT TOOLS

PART NO. 66A891568


6" ±.062
BONE FIBRE
1"/4

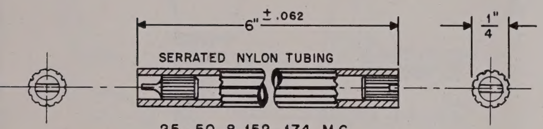
25-50 & 152-174 MC
SENSICON & DISPATCHER RECEIVER
TOP TUNING ONLY
(REPLACED BY 66A835721)

PART NO. 66A835721
(ALSO PART NO. 66A800824)


1"/4
5 5"/8 ±.062
NYLON BLADE
NYLON ROD

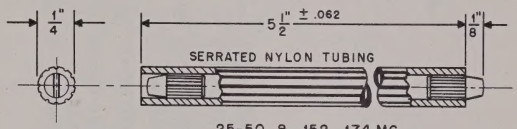
25-50 & 152-174 MC
SENSICON, DISPATCHER, UNI-CHANNEL & AM RECEIVER
TOP & BOTTOM TUNING
(PART NO. 66A835721 MAY ONLY BE USED IN PLACE
OF THE 66A8000824 FOR ALL APPLICATIONS)

PART NO. 66A891488


6" ±.062
SERRATED NYLON TUBING
1"/4

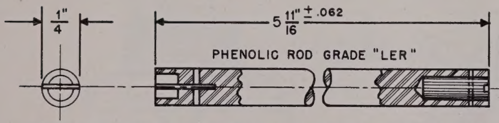
25-50 & 152-174 MC
STRIP TRANSMITTER, SENSICON, DISPATCHER, UNI-CHANNEL AND AM RECEIVER
RECEIVER BOTTOM TUNING ONLY
(REPLACED BY 66A835721)

PART NO. 66A891487


1"/4
5 1"/2 ±.062
1"/8
SERRATED NYLON TUBING

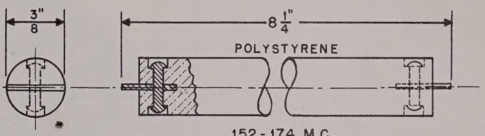
25-50 & 152-174 MC
STRIP TRANSMITTER

PART NO. 66A474489


1"/4
5 11"/16 ±.062
PHENOLIC ROD GRADE "LER"

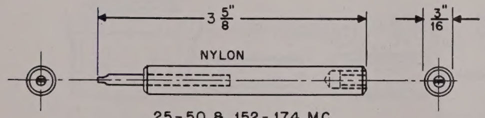
STRIP TRANSMITTER, SENSICON, DISPATCHER, UNI-CHANNEL AND AM RECEIVER
RECEIVER BOTTOM TUNING ONLY

PART NO. 66A84645


3"/8
8 1"/4
POLYSTYRENE

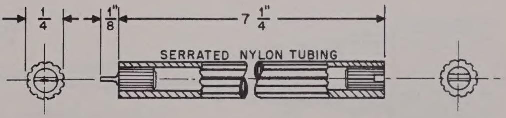
152-174 MC
1/4 KW
P-8310-B FINAL AMPLIFIER

PART NO. 66A891846


3 5"/8
NYLON
3"/16

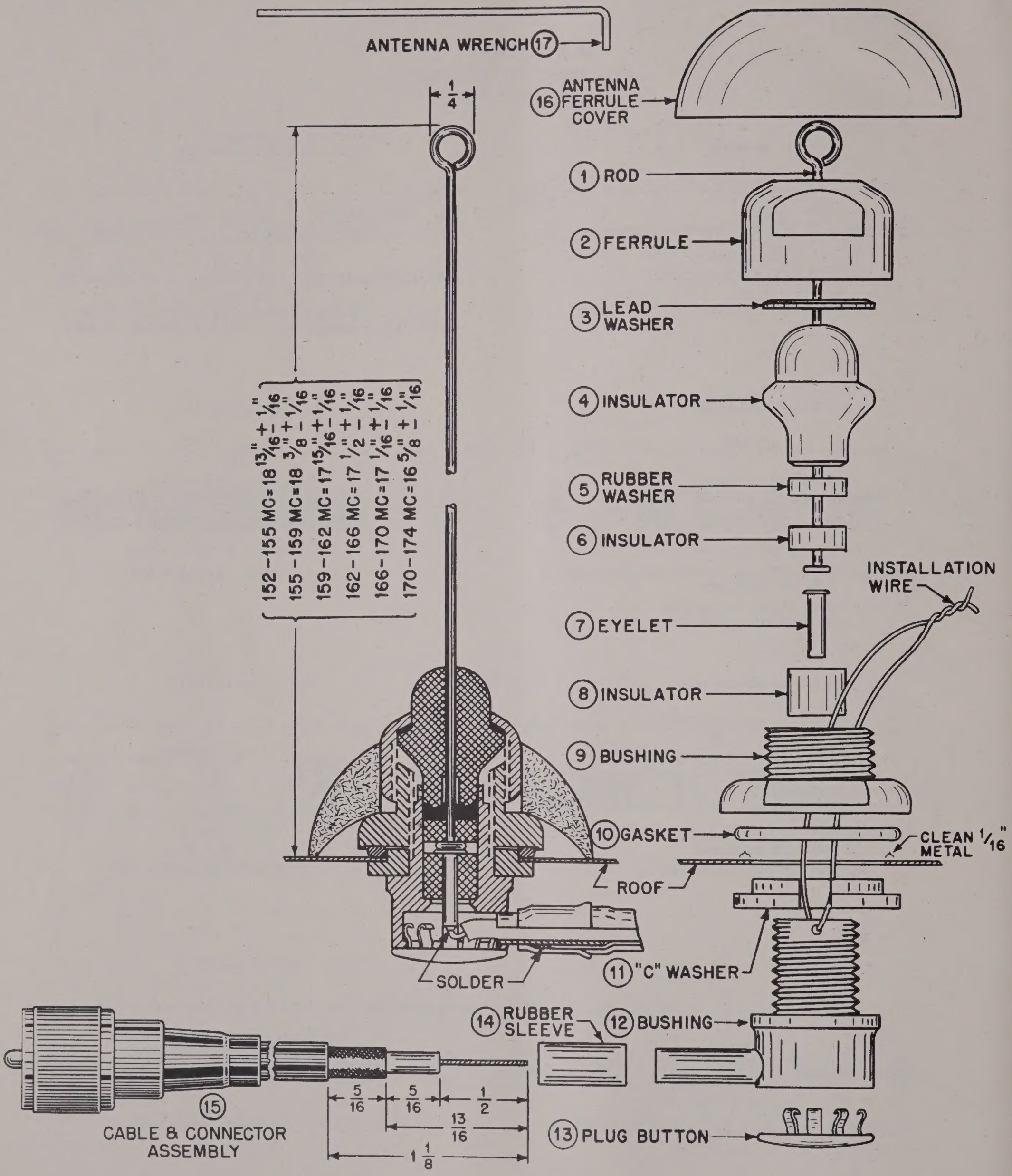
25-50 & 152-174 MC
"HANDIE-TALKIE" UNIT AND FM RADIOPHONE PACK
ALL STAGES

PART NO. 66A810479


1/4
1"/8
7 1"/4
SERRATED NYLON TUBING

UNI-CHANNEL FREQUENCY MONITORS

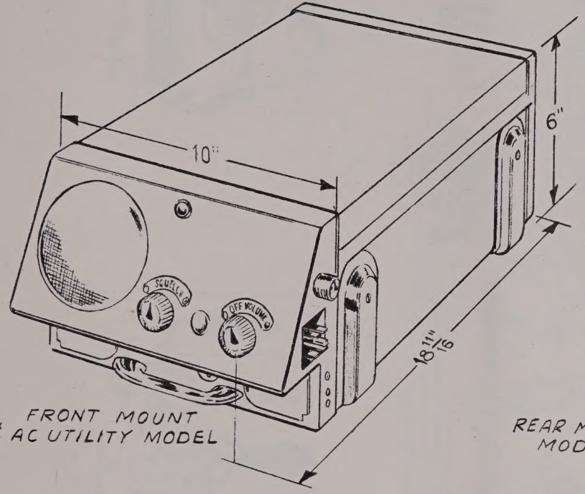
MOTOROLA ANTENNA INSTALLATION DETAIL
MODEL P-8553-B ROOF TOP ANTENNA


ANTENNA WRENCH (17)
(16) ANTENNA FERRULE COVER
1/4
(1) ROD
(2) FERRULE
(3) LEAD WASHER
(4) INSULATOR
(5) RUBBER WASHER
(6) INSULATOR
INSTALLATION WIRE
(7) EYELET
(8) INSULATOR
(9) BUSHING
(10) GASKET
CLEAN 1/16" METAL
ROOF
ROOF
(11) "C" WASHER
SOLDER
(14) RUBBER SLEEVE
(12) BUSHING
(13) PLUG BUTTON
(15) CABLE & CONNECTOR ASSEMBLY
5/16
5/16
1/2
13/16
1 1/8
152-155 MC=18 13/16" ± 1/16"
155-159 MC=18 3/8" ± 1/16"
159-162 MC=17 15/16" ± 1/16"
162-166 MC=17 1/2" ± 1/16"
166-170 MC=17 1/16" ± 1/16"
170-174 MC=16 5/8" ± 1/16"

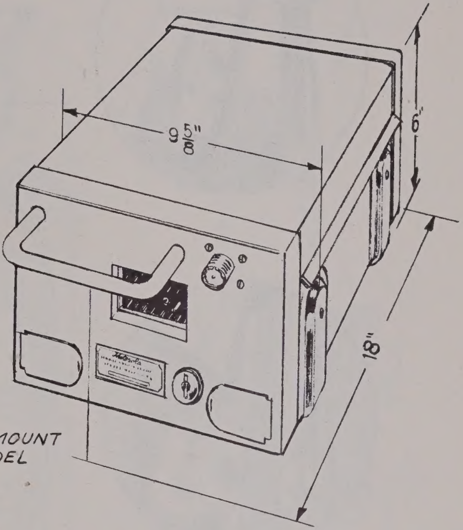
PART NO. 69C481038
ISSUE - A 3/54-RS

MOTOROLA DIMENSIONAL DETAIL
"10 INCH" TYPE EQUIPMENT HOUSING

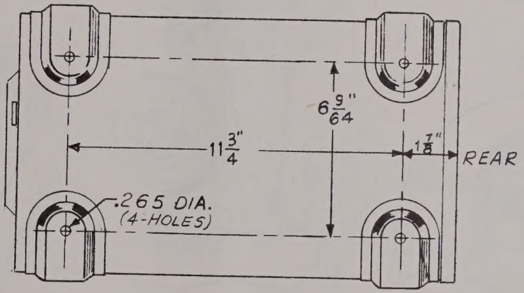
MOTOROLA OUTLINE DIMENSIONAL AND MOUNTING DETAIL


10"
6"
$18\frac{11}{16}$"
SQUELCH
OFF VOLUME

FRONT MOUNT
& AC UTILITY MODEL


$9\frac{5}{8}$"
6"
18"

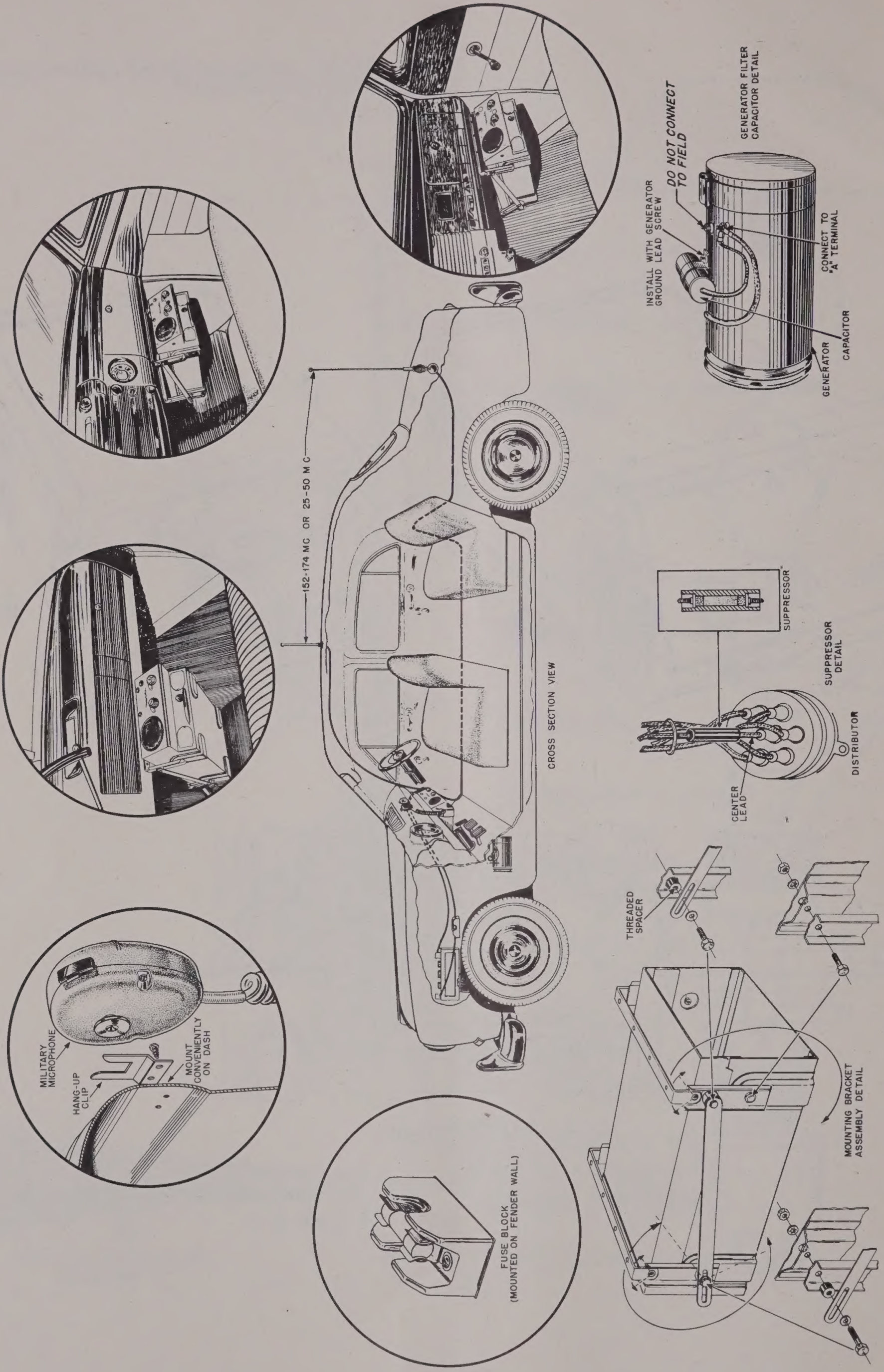
REAR MOUNT
MODEL


$6\frac{9}{64}$"
$11\frac{3}{4}$"
$1\frac{7}{8}$"
REAR
.265 DIA.
(4-HOLES)

BOTTOM VIEW

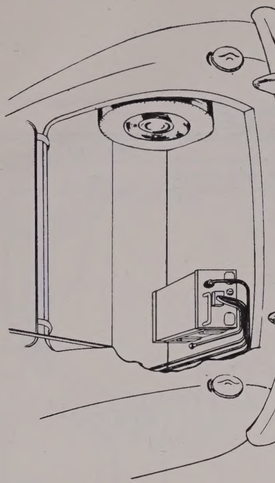
PART NO. 69B802109
ISSUE - O 3/54-RS

MOTOROLA INSTALLATION DETAIL
TYPICAL FRONT MOUNT INSTALLATION

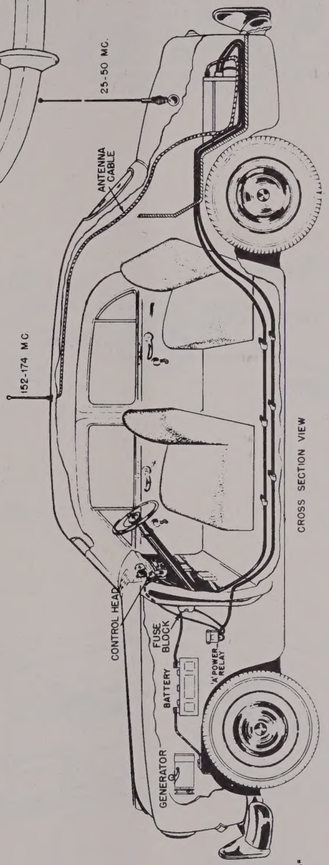

GENERATOR FILTER CAPACITOR DETAIL
DO NOT CONNECT TO FIELD
INSTALL WITH GENERATOR GROUND LEAD SCREW
CONNECT TO "A" TERMINAL
CAPACITOR
GENERATOR
152-174 MC OR 25-50 MC
CROSS SECTION VIEW
SUPPRESSOR
SUPPRESSOR DETAIL
DISTRIBUTOR
CENTER LEAD
THREADED SPACER
MOUNTING BRACKET ASSEMBLY DETAIL
MILITARY MICROPHONE
HANG-UP CLIP
MOUNT CONVENIENTLY ON DASH
FUSE BLOCK (MOUNTED ON FENDER WALL)

PART NO. 69D800203
ISSUE - A 3/54-RS

MOTOROLA INSTALLATION DETAIL
TYPICAL TRUNK MOUNT INSTALLATION

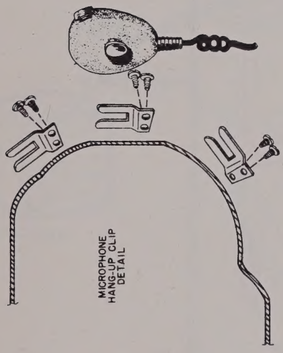


REAR VIEW

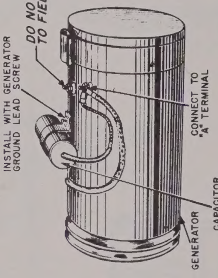


25-50 MC.
ANTENNA CABLE
152-174 MC.
CONTROL HEAD
FUSE BLOCK
'A' POWER RELAY
BATTERY
GENERATOR

CROSS SECTION VIEW

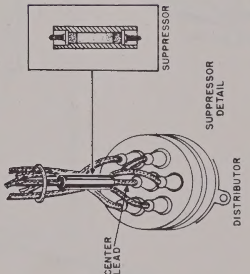


MICROPHONE HANG-UP CLIP DETAIL



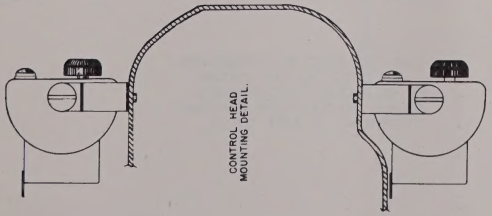
DO NOT CONNECT TO FIELD
INSTALL WITH GENERATOR GROUND LEAD SCREW
CONNECT TO "A" TERMINAL
CAPACITOR
GENERATOR

GENERATOR FILTER CAPACITOR DETAIL

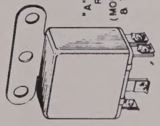


SUPPRESSOR
CENTER LEAD
DISTRIBUTOR

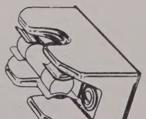
SUPPRESSOR DETAIL



CONTROL HEAD MOUNTING DETAIL.



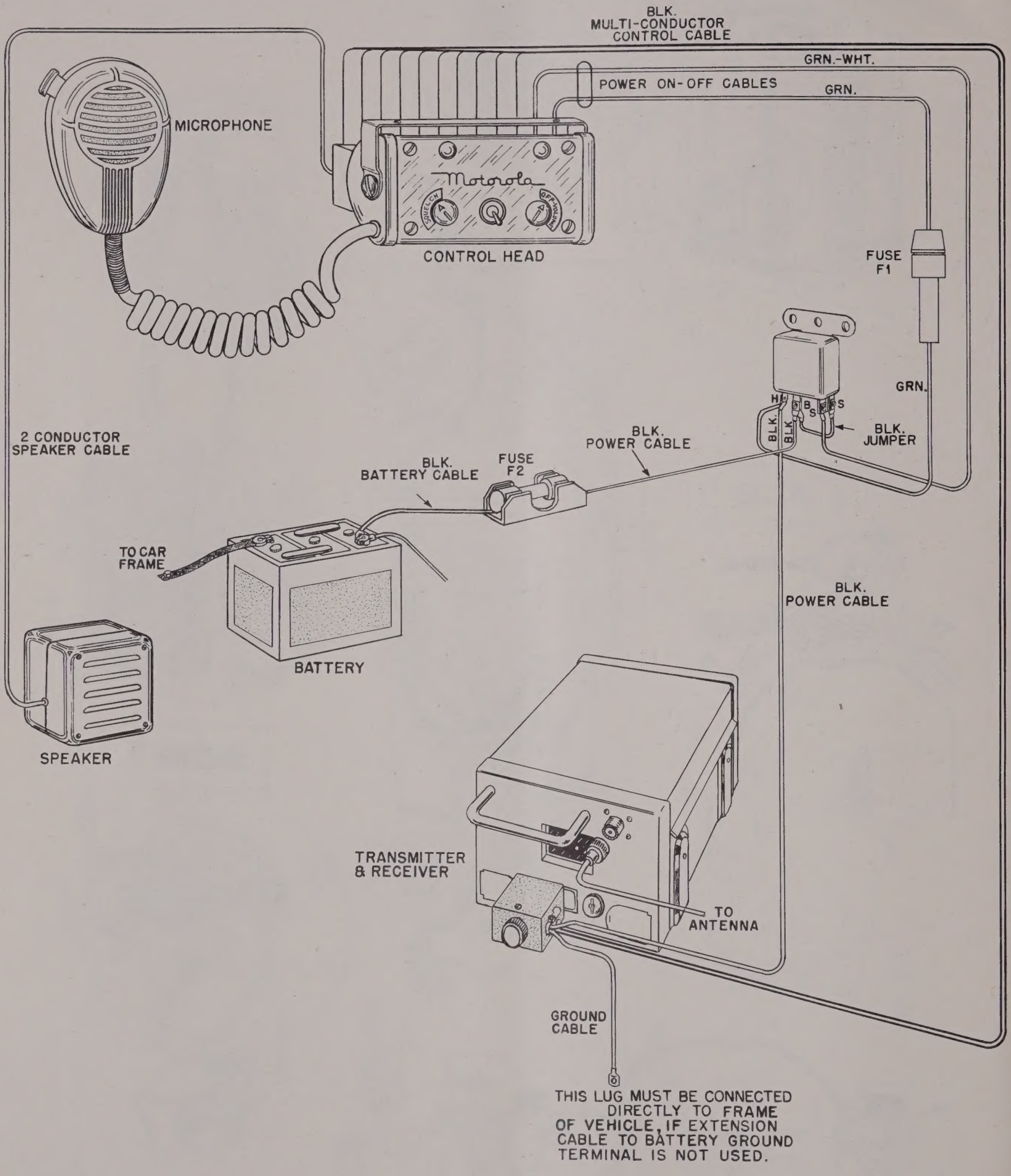
"A" POWER RELAY (MOUNTING BRACKET "UP" & TERMINALS "DOWN"



FUSE BLOCK

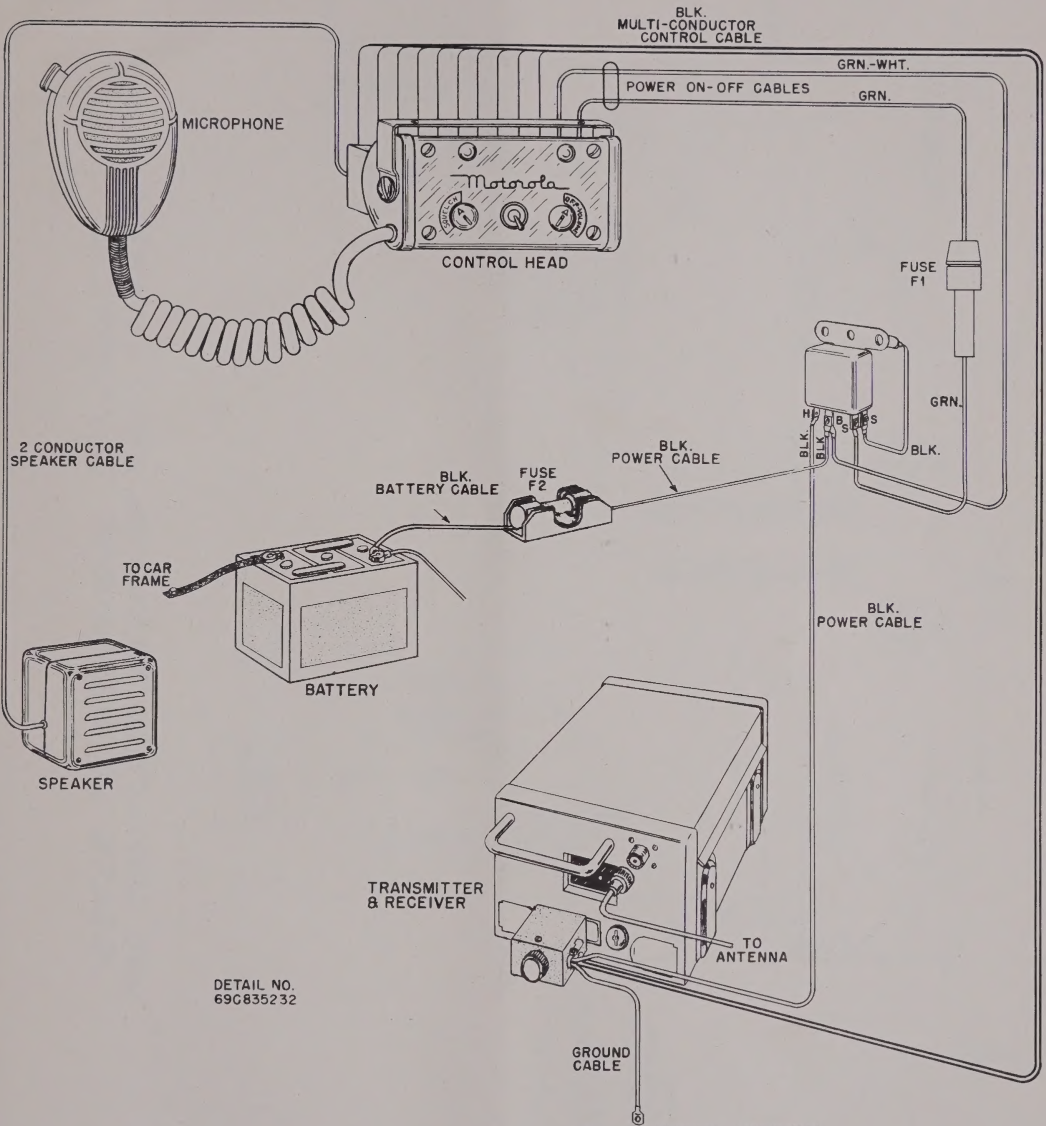
PART NO. 69D802254
ISSUE - A 3/54-RS

MOTOROLA CABLING DETAIL
"10 INCH" HOUSING TRUNK MOUNT MODELS
USING TU124 OR TU203 SERIES CONTROL HEAD


BLK.
MULTI-CONDUCTOR
CONTROL CABLE
GRN.-WHT.
POWER ON-OFF CABLES
GRN.
MICROPHONE
Motorola
SQUELCH
OFF VOLUME
CONTROL HEAD
FUSE
F1
GRN.
H
B
S
S
BLK.
BLK.
BLK.
JUMPER
BLK.
POWER CABLE
2 CONDUCTOR
SPEAKER CABLE
BLK.
BATTERY CABLE
FUSE
F2
TO CAR
FRAME
BATTERY
BLK.
POWER CABLE
SPEAKER
TRANSMITTER
& RECEIVER
TO
ANTENNA
GROUND
CABLE
THIS LUG MUST BE CONNECTED DIRECTLY TO FRAME OF VEHICLE, IF EXTENSION CABLE TO BATTERY GROUND TERMINAL IS NOT USED.

PART NO. 69C831702
ISSUE - C 3/54-RS

MOTOROLA CABLING DETAIL
"10 INCH" HOUSING TRUNK MOUNT MODELS
USING P-9022 SERIES CONTROL HEAD


BLK.
MULTI-CONDUCTOR
CONTROL CABLE
GRN.-WHT.
POWER ON-OFF CABLES
GRN.
MICROPHONE
Motorola
SQUELCH
OFF-VOLUME
CONTROL HEAD
FUSE
F1
GRN.
H
B
S
S
BLK.
BLK.
BLK
2 CONDUCTOR
SPEAKER CABLE
BLK.
POWER CABLE
BLK.
BATTERY CABLE
FUSE
F2
TO CAR
FRAME
BATTERY
BLK.
POWER CABLE
SPEAKER
TRANSMITTER
& RECEIVER
TO
ANTENNA
GROUND
CABLE

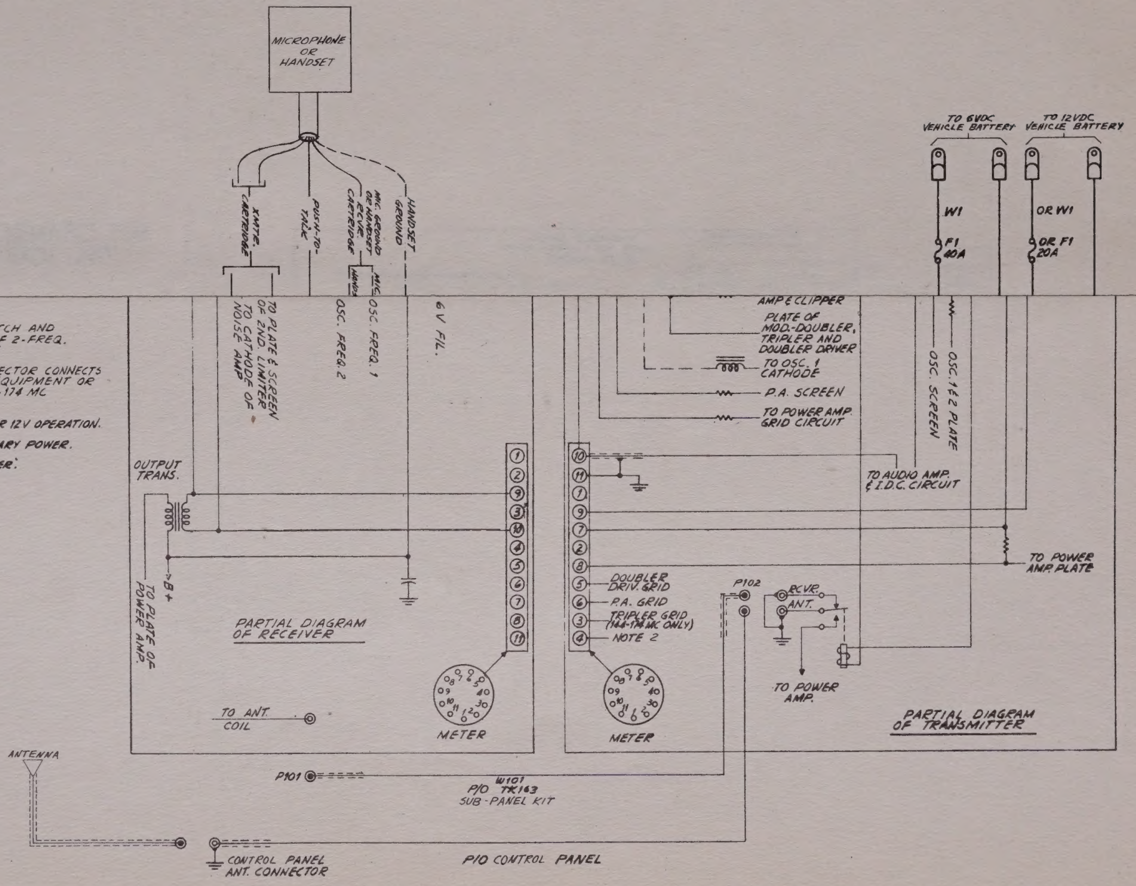
DETAIL NO.
69C835232

THIS LUG MUST BE CONNECTED
DIRECTLY TO CAR FRAME UNLESS
OPTIONAL GROUND EXTENSION
CABLE TO BATTERY GROUND
IS USED.

PART NO. 69C835232
ISSUE - O 3/54-RS

MOTOROLA INTERCABLING DIAGRAM
FRONT MOUNT INSTALLATION

REFER TO INDIVIDUAL SCHEMATIC
FOR COMPLETE DETAIL OF EACH CHASSIS


MICROPHONE OR HANDSET
XMTR. CARTRIDGE
PUSH-TO-TALK
MIC. GROUND OR HANDSET RCVR. CARTRIDGE
MIC.
HANDS.
HANDSET GROUND
TO 6VDC VEHICLE BATTERY
TO 12VDC VEHICLE BATTERY
W1
F1 40A
OR W1
OR F1 20A
TO PLATE & SCREEN OF 2ND. LIMITER
TO CATHODE OF NOISE AMP
OSC. FREQ. 2
OSC. FREQ. 1
6V FIL.
OUTPUT TRANS.
+B+
TO PLATE OF POWER AMP.
PARTIAL DIAGRAM OF RECEIVER
TO ANT. COIL
METER
AMP & CLIPPER
PLATE OF MOD.-DOUBLER, TRIPLER AND DOUBLER DRIVER
TO OSC. 1 CATHODE
P.A. SCREEN
TO POWER AMP. GRID CIRCUIT
OSC. SCREEN
OSC. 1 & 2 PLATE
TO AUDIO AMP. & I.D.C. CIRCUIT
TO POWER AMP. PLATE
DOUBLER DRIV. GRID
P.A. GRID
TRIPLER GRID (144-174 MC ONLY)
NOTE 2
P102
RCVR.
ANT.
TO POWER AMP.
METER
PARTIAL DIAGRAM OF TRANSMITTER
ANTENNA
P101
W101 P/O TK163 SUB-PANEL KIT
CONTROL PANEL ANT. CONNECTOR
P/O CONTROL PANEL

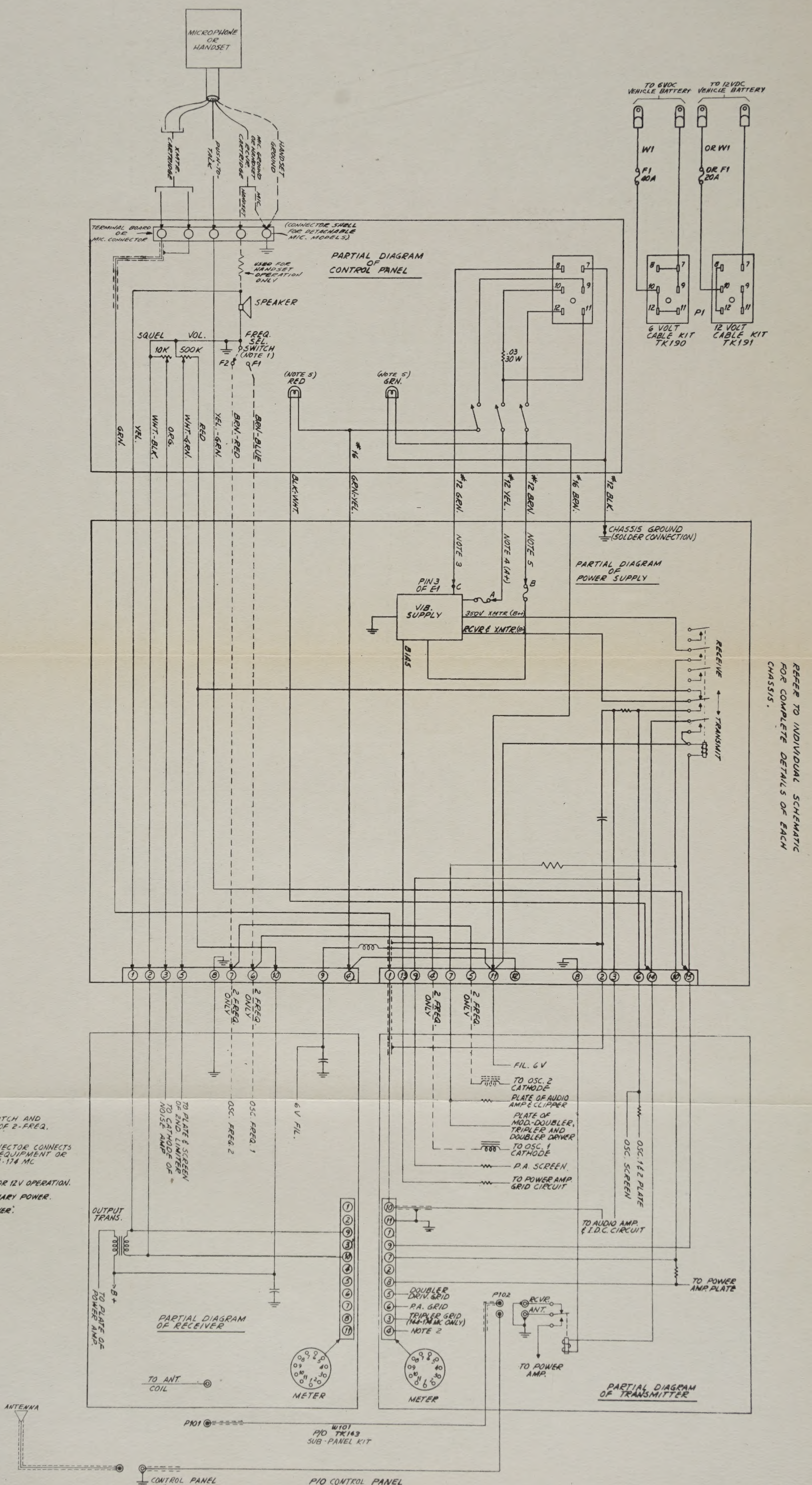
NOTES:

1. THE FREQUENCY SELECTOR SWITCH AND ASSOCIATED LEADS ARE PART OF 2-FREQ. CONTROL PANELS ONLY.
2. PIN 4 OF XMTR. METERING CONNECTOR CONNECTS TO TRIPLER GRID IN 25-54 MC EQUIPMENT OR TO 2ND. DOUBLER GRID IN 144-174 MC EQUIPMENT.
3. GROUND FOR 6V OPERATION, +6V FOR 12V OPERATION.
4. +6V OR +12V DEPENDING ON PRIMARY POWER.
5. +6V WITH 6 OR 12V PRIMARY POWER.

PART NO. 63E836077
ISSUE - O 3/54-UM

MOTORÓLA INTERCABLING DIAGRAM
FRONT MOUNT INSTALLATION

REFER TO INDIVIDUAL SCHEMATIC FOR COMPLETE DETAIL OF EACH CHASSIS

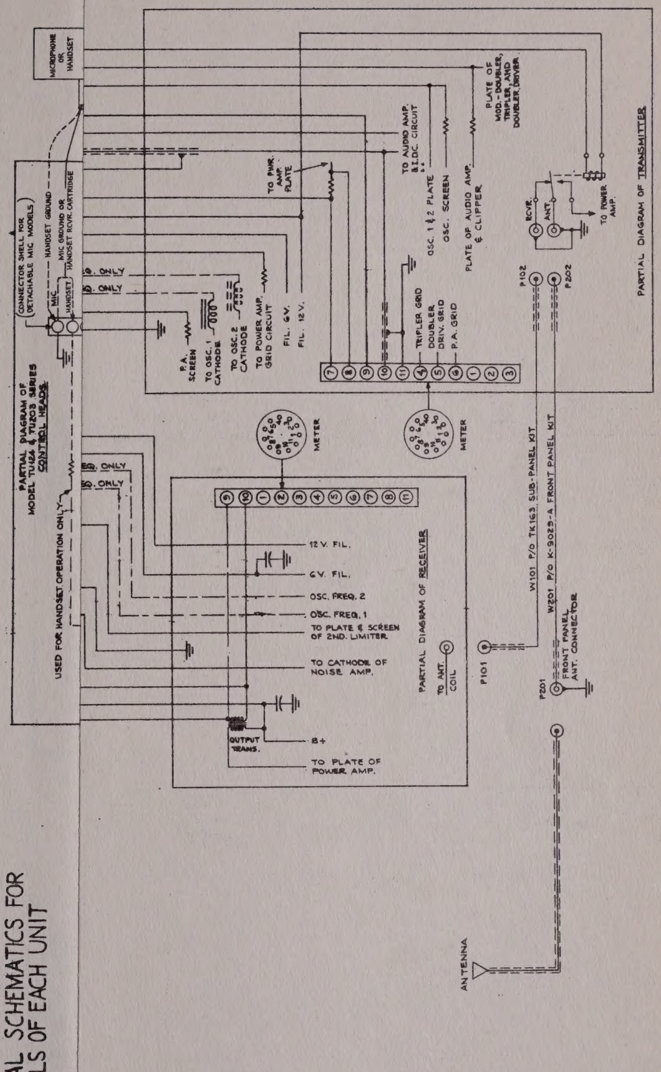

MICROPHONE OR HANDSET
XMTR. CARTRIDGE
PUSH-TO-TALK
MIC. GROUND OR HANDSET RCVR. CARTRIDGE
HANDSET GROUND
HANDSET
MIC.
TERMINAL BOARD OR MIC. CONNECTOR
(CONNECTOR SHELL FOR DETACHABLE MIC. MODELS)
USED FOR HANDSET OPERATION ONLY
PARTIAL DIAGRAM OF CONTROL PANEL
SPEAKER
SQUEL
VOL.
10K
500K
FREQ. SEL. SWITCH (NOTE 1)
F2
F1
(NOTE 5) RED
(NOTE 5) GRN.
.03 30W
GRN.
YEL.
WHT.-BLK.
ORG.
WHT.-GRN.
RED
YEL.-GRN.
BRN.-RED
BRN.-BLUE
BLK.-WHT.
#16
GRN.-YEL.
#12 GRN.
#12 YEL.
#12 BRN.
#16 BRN.
#12 BLK.
CHASSIS GROUND (SOLDER CONNECTION)
NOTE 3
NOTE 4 (A+)
NOTE 5
PARTIAL DIAGRAM OF POWER SUPPLY
PIN 3 OF E1
C
A
B
VIB. SUPPLY
350V XMTR (B+)
RCVR & XMTR (B+)
BIAS
RECEIVE ⟷ TRANSMIT
REFER TO INDIVIDUAL SCHEMATIC FOR COMPLETE DETAILS OF EACH CHASSIS.
TO 6VDC VEHICLE BATTERY
TO 12VDC VEHICLE BATTERY
W1
OR W1
F1 40A
OR F1 20A
P1
6 VOLT CABLE KIT TK190
12 VOLT CABLE KIT TK191
1 2 3 5 8 7 6 10 9 4
1 13 9 4 7 5 11 12 8 2 3 6 14 10 15
2 FREQ. ONLY
OSC. FREQ. 2
OSC. FREQ. 1
6V FIL.
TO PLATE & SCREEN OF 2ND LIMITER
TO CATHODE OF NOISE AMP
OUTPUT TRANS.
B+
TO PLATE OF POWER AMP.
PARTIAL DIAGRAM OF RECEIVER
TO ANT. COIL
METER
FIL. 6V
TO OSC. 2 CATHODE
PLATE OF AUDIO AMP & CLIPPER
PLATE OF MOD.-DOUBLER, TRIPLER AND DOUBLER DRIVER
TO OSC. 1 CATHODE
P.A. SCREEN.
TO POWER AMP. GRID CIRCUIT
OSC. SCREEN
OSC. 1 & 2 PLATE
TO AUDIO AMP. & I.D.C. CIRCUIT
TO POWER AMP. PLATE
DOUBLER DRIV. GRID
P.A. GRID
TRIPLER GRID (144-174MC ONLY)
NOTE 2
P102
RCVR.
ANT.
TO POWER AMP.
PARTIAL DIAGRAM OF TRANSMITTER
ANTENNA
P101
W101 P/O TK143 SUB-PANEL KIT
CONTROL PANEL ANT. CONNECTOR
P/O CONTROL PANEL

NOTES:

1. THE FREQUENCY SELECTOR SWITCH AND ASSOCIATED LEADS ARE PART OF 2-FREQ. CONTROL PANELS ONLY.
2. PIN 4 OF XMTR. METERING CONNECTOR CONNECTS TO TRIPLER GRID IN 25-54 MC EQUIPMENT OR TO 2ND. DOUBLER GRID IN 144-174 MC EQUIPMENT.
3. GROUND FOR 6V OPERATION, +6V FOR 12V OPERATION.
4. +6V OR +12V DEPENDING ON PRIMARY POWER.
5. +6V WITH 6 OR 12V PRIMARY POWER.

PART NO. 63E836077
ISSUE - O 3/54-UM

MOTOROLA INTERCABLING DIAGRAM
TRUNK MOUNT INSTALLATION USING
TU124 OR TU203 SERIES CONTROL HEAD


MICROPHONE OR HANDSET
CONNECTOR SHELL FOR DETACHABLE MIC MODELS
HANDSET GROUND
MIC GROUND OR HANDSET RCVR. CARTRIDGE
MIC
HANDSET
PARTIAL DIAGRAM OF MODEL TU124 & TU203 SERIES CONTROL HEADS
USED FOR HANDSET OPERATION ONLY
EQ. ONLY
EQ. ONLY
P.A. SCREEN
TO OSC. 1 CATHODE
TO OSC. 2 CATHODE
TO POWER AMP. GRID CIRCUIT
FIL. 6V.
FIL. 12V.
TO PWR. AMP. PLATE
TO AUDIO AMP. B.I.DC. CIRCUIT
OSC. 1 & 2 PLATE
OSC. SCREEN
PLATE OF AUDIO AMP. & CLIPPER
PLATE OF MOD.-DOUBLER, TRIPLER, AND DOUBLER DRIVER
TRIPLER GRID
DOUBLER DRIV. GRID
P.A. GRID
RCVR.
ANT.
TO POWER AMP.
P102
P202
PARTIAL DIAGRAM OF TRANSMITTER
METER
METER
12 V. FIL.
6V. FIL.
OSC. FREQ. 2
OSC. FREQ. 1
TO PLATE & SCREEN OF 2ND. LIMITER
TO CATHODE OF NOISE AMP.
OUTPUT TRANS.
B+
TO PLATE OF POWER AMP.
PARTIAL DIAGRAM OF RECEIVER
TO ANT. COIL
P101
W101 P/O TK163 SUB-PANEL KIT
W201 P/O K-9029-A FRONT PANEL KIT
P201
FRONT PANEL ANT. CONNECTOR
ANTENNA

REFER TO INDIVIDUAL SCHEMATICS FOR
COMPLETE DETAILS OF EACH UNIT

PART NO. 63E836076
ISSUE - O 3/54-UM

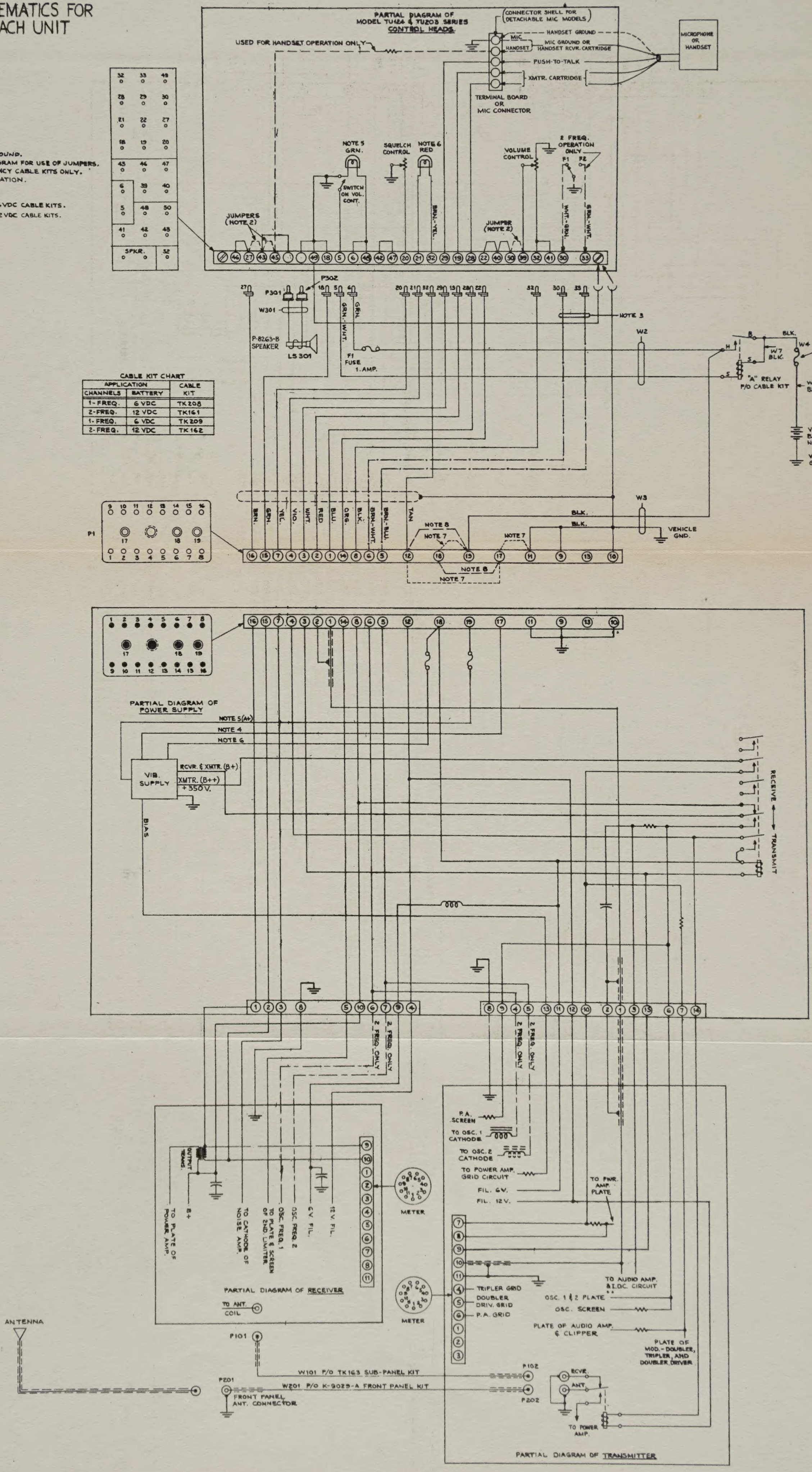
MOTOROLA INTERCABLING DIAGRAM
TRUNK MOUNT INSTALLATION USING
TU124 OR TU203 SERIES CONTROL HEAD

REFER TO INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH UNIT

NOTES:
1. BATTERY TO BE EITHER NEGATIVE OR POSITIVE GROUND.
2. REFER TO APPLICABLE CONTROL HEAD SCHEMATIC DIAGRAM FOR USE OF JUMPERS.
3. DOT DASHED CABLE KIT LEADS PART OF 2-FREQUENCY CABLE KITS ONLY.
4. GROUND FOR 6V. OPERATION, +6V. FOR 12V. OPERATION.
5. +6V. OR +12V. DEPENDING ON PRIMARY POWER.
6. +6V. WITH 6 OR 12V. PRIMARY POWER.
7. DOTTED CABLE KIT JUMPERS ARE USED ONLY WITH 6VDC CABLE KITS.
8. DASHED CABLE KIT JUMPERS ARE USED ONLY WITH 12VDC CABLE KITS.

CABLE KIT CHART

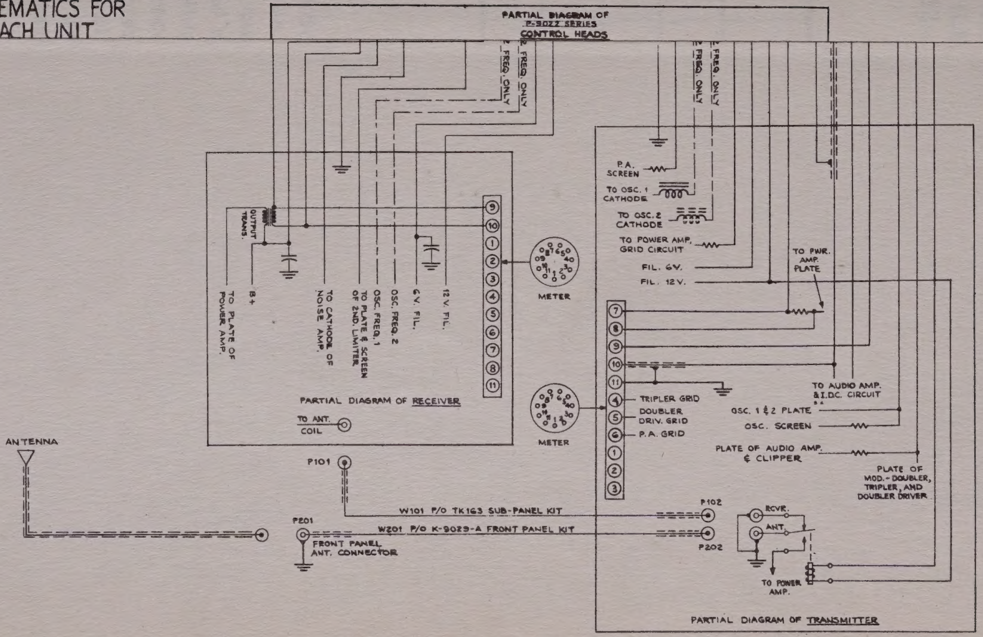
APPLICATION		CABLE KIT
CHANNELS	BATTERY	
1-FREQ.	6 VDC	TK208
2-FREQ.	12 VDC	TK161
1-FREQ.	6 VDC	TK209
2-FREQ.	12 VDC	TK162


PARTIAL DIAGRAM OF MODEL TU124 & TU203 SERIES CONTROL HEADS
CONNECTOR SHELL FOR DETACHABLE MIC MODELS
MIC
HANDSET
HANDSET GROUND
MIC GROUND OR HANDSET RCVR. CARTRIDGE
PUSH-TO-TALK
XMTR. CARTRIDGE
MICROPHONE OR HANDSET
TERMINAL BOARD OR MIC CONNECTOR
USED FOR HANDSET OPERATION ONLY
NOTE 5 GRN.
SWITCH ON VOL. CONT.
SQUELCH CONTROL
NOTE 6 RED
BRN.-YEL.
VOLUME CONTROL
2 FREQ. OPERATION ONLY
P1
P2
WHT.-GRN.
GRN.-WHT.
JUMPERS (NOTE 2)
JUMPER (NOTE 2)
SPKR.
P302
P301
W301
P-8263-B SPEAKER
LS 301
GRN.
GRN.-WHT.
F1 FUSE 1 AMP.
NOTE 3
W2
W3
BLK.
W4
W7 BLK.
"A" RELAY P/O CABLE KIT
F2 40 AMP. FUSE (6VDC) OR 20 AMP. FUSE (12 VDC)
W5 BLK.
VEHICLE BATTERY NOTE 1
VEHICLE GND.
BRN.
GRN.
YEL.
VIO.
WHT.
RED
BLU.
ORG.
BLK.
BRN.-WHT.
BRN.-BLU.
TAN
NOTE 7
NOTE 8
P1
PARTIAL DIAGRAM OF POWER SUPPLY
NOTE 5 (A+)
NOTE 4
NOTE 6
VIB. SUPPLY
RCVR. & XMTR. (B+)
XMTR. (B++) +350V.
BIAS
RECEIVE ← → TRANSMIT
2 FREQ. ONLY
PARTIAL DIAGRAM OF RECEIVER
12 V. FIL.
6 V. FIL.
OSC. FREQ. 2
OSC. FREQ. 1
TO PLATE & SCREEN OF 2ND. LIMITER
TO CATHODE OF NOISE AMP.
OUTPUT TRANS.
B+
TO PLATE OF POWER AMP.
TO ANT. COIL
METER
P.A. SCREEN
TO OSC. 1 CATHODE
TO OSC. 2 CATHODE
TO POWER AMP. GRID CIRCUIT
FIL. 6V.
FIL. 12V.
TO PWR. AMP. PLATE
TRIPLER GRID
DOUBLER DRIV. GRID
P.A. GRID
TO AUDIO AMP. & I.D.C. CIRCUIT
OSC. 1 & 2 PLATE
OSC. SCREEN
PLATE OF AUDIO AMP. & CLIPPER
PLATE OF MOD.-DOUBLER, TRIPLER, AND DOUBLER DRIVER
RCVR.
ANT.
TO POWER AMP.
PARTIAL DIAGRAM OF TRANSMITTER
P101
P102
P201
P202
W101 P/O TK163 SUB-PANEL KIT
W201 P/O K-9023-A FRONT PANEL KIT
FRONT PANEL ANT. CONNECTOR
ANTENNA

PART NO. 63E836076
ISSUE - O 3/54-UM

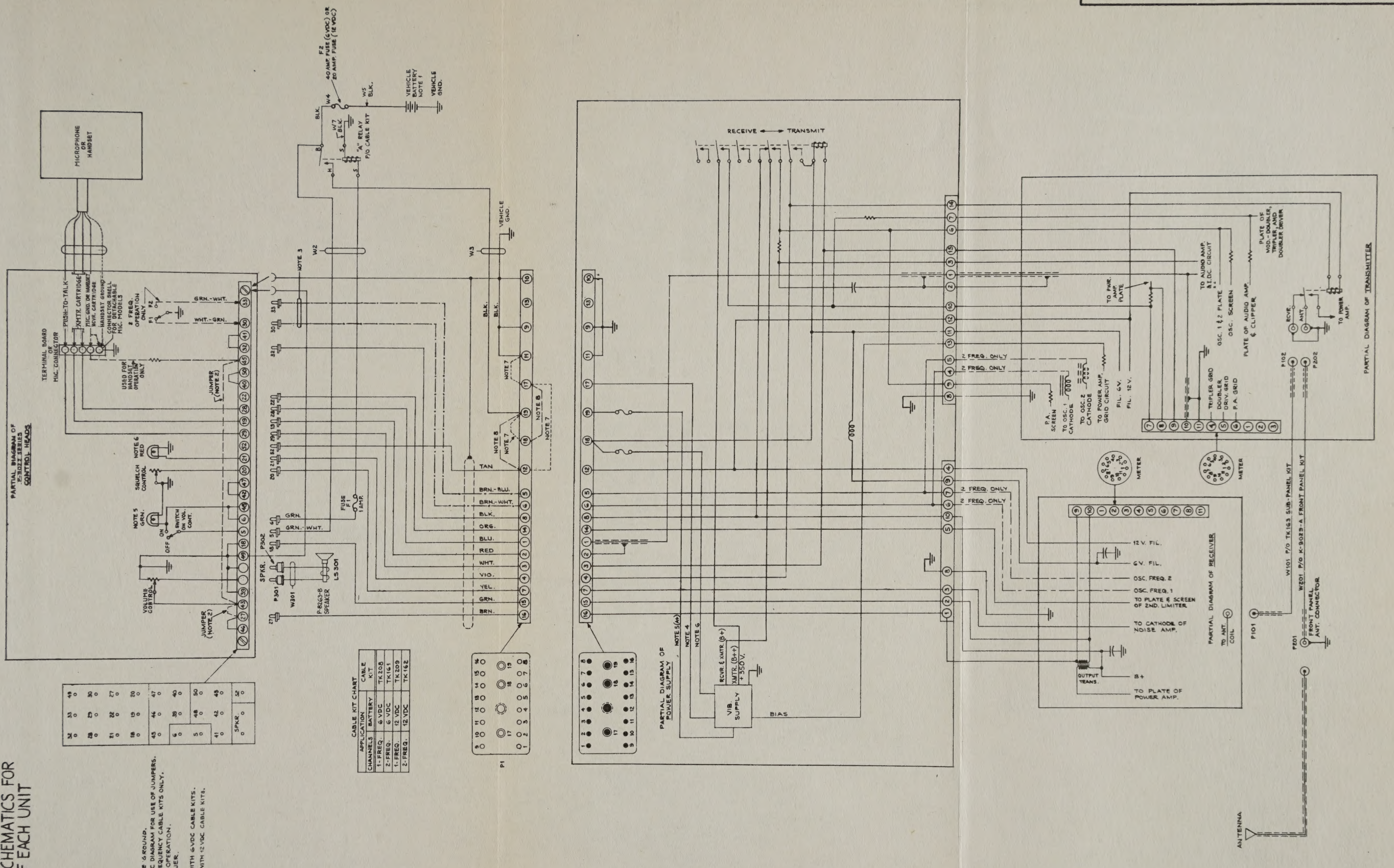
MOTOROLA INTERCABLING DIAGRAM
TRUNK MOUNT INSTALLATION USING
K-9022 SERIES CONTROL HEAD

REFER TO INDIVIDUAL SCHEMATICS FOR
COMPLETE DETAILS OF EACH UNIT


PARTIAL DIAGRAM OF
P-9022 SERIES
CONTROL HEADS
2 FREQ. ONLY
2 FREQ. ONLY
2 FREQ. ONLY
2 FREQ. ONLY
OUTPUT TRANS.
12 V. FIL.
6V. FIL.
OSC. FREQ. 2
OSC. FREQ. 1
TO PLATE & SCREEN OF 2ND. LIMITER
TO CATHODE OF NOISE AMP.
B+
TO PLATE OF POWER AMP.
PARTIAL DIAGRAM OF RECEIVER
TO ANT. COIL
METER
METER
P.A. SCREEN
TO OSC. 1 CATHODE
TO OSC. 2 CATHODE
TO POWER AMP. GRID CIRCUIT
FIL. 6V.
FIL. 12V.
TO PWR. AMP. PLATE
TO AUDIO AMP. & I.D.C. CIRCUIT
TRIPLER GRID
DOUBLER DRIV. GRID
P.A. GRID
OSC. 1 & 2 PLATE
OSC. SCREEN
PLATE OF AUDIO AMP. & CLIPPER
PLATE OF MOD.-DOUBLER, TRIPLER, AND DOUBLER DRIVER
RCVR.
ANT.
TO POWER AMP.
PARTIAL DIAGRAM OF TRANSMITTER
ANTENNA
P101
P102
P201
P202
W101 P/O TK163 SUB-PANEL KIT
W201 P/O K-9029-A FRONT PANEL KIT
FRONT PANEL ANT. CONNECTOR

PART NO. 63E836078
ISSUE - O 3/54-UM

MOTOROLA INTERCABLING DIAGRAM
TRUNK MOUNT INSTALLATION USING
K-9022 SERIES CONTROL HEAD


MICROPHONE OR HANDSET
PUSH-TO-TALK
XMTR CARTRIDGE
MIC. GND. OR SHIELD
RCVR. CARTRIDGE
HANDSET GROUND
CONNECTOR SHELL FOR DETACHABLE MIC. MODELS
TERMINAL BOARD OR MIC. CONNECTOR
2 FREQ. OPERATION ONLY
USED FOR HANDSET OPERATION ONLY
JUMPER (NOTE 2)
PARTIAL DIAGRAM OF K-9022 SERIES CONTROL HEADS
SQUELCH CONTROL
NOTE 6 RED
NOTE 5 GRN.
SWITCH ON VOL. CONT.
ON
OFF
VOLUME CONTROL
GRN.-WHT.
WHT.-GRN.
NOTE 3
W2
W3
VEHICLE GND.
BLK.
W4
W5 BLK.
W7 BLK.
F2 40 AMP FUSE (6VDC) OR 20 AMP FUSE (12VDC)
"A" RELAY P/O CABLE KIT
VEHICLE BATTERY NOTE 1
VEHICLE GND.
FUSE F1 1 AMP.
SPKR.
P302
P301
W301
P-8263-B SPEAKER
LS301
TAN
BRN.-BLU.
BRN.-WHT.
BLK.
ORG.
BLU.
RED
WHT.
VIO.
YEL.
GRN.
BRN.
NOTE 7
NOTE 8
P1
RECEIVE ←→ TRANSMIT
PARTIAL DIAGRAM OF POWER SUPPLY
NOTE 5 (6V)
NOTE 4
NOTE 6
RCVR. & XMTR. (B+)
XMTR. (B++) +350V.
VIB. SUPPLY
BIAS
2 FREQ. ONLY
P.A. SCREEN
TO OSC. 1 CATHODE
TO OSC. 2 CATHODE
TO POWER AMP. GRID CIRCUIT
FIL. 6V.
FIL. 12V.
TO PWR. AMP. PLATE
TO AUDIO AMP. & D.C. CIRCUIT
OSC. 1 & 2 PLATE
OSC. SCREEN
PLATE OF AUDIO AMP. & CLIPPER
TRIPLER GRID
DOUBLER DRIV. GRID
P.A. GRID
PLATE OF MOD.-DOUBLER, TRIPLER AND DOUBLER DRIVER
RCVR.
ANT.
TO POWER AMP.
PARTIAL DIAGRAM OF TRANSMITTER
P102
P202
METER
12V. FIL.
6V. FIL.
OSC. FREQ. 2
OSC. FREQ. 1
TO PLATE & SCREEN OF 2ND. LIMITER
TO CATHODE OF NOISE AMP.
OUTPUT TRANS.
B+
TO PLATE OF POWER AMP.
PARTIAL DIAGRAM OF RECEIVER
TO ANT. COIL
W101 P/O TK163 SUB-PANEL KIT
W201 P/O K-9023-A FRONT PANEL KIT
P101
P201
FRONT PANEL ANT. CONNECTOR
ANTENNA

CABLE KIT CHART

APPLICATION		CABLE KIT
CHANNELS	BATTERY	
1-FREQ.	6 VDC	TK208
2-FREQ.	6 VDC	TK161
1-FREQ.	12 VDC	TK209
2-FREQ.	12 VDC	TK162

REFER TO INDIVIDUAL SCHEMATICS FOR COMPLETE DETAILS OF EACH UNIT

NOTES:
1. BATTERY TO BE EITHER NEGATIVE OR POSITIVE GROUND.
2. REFER TO APPLICABLE CONTROL HEAD SCHEMATIC DIAGRAM FOR USE OF JUMPERS.
3. DOT DASHED CABLE KIT LEADS PART OF 2-FREQUENCY CABLE KITS ONLY.
4. GROUND FOR 6V. OPERATION, +6V. FOR 12V. OPERATION.
5. +6V OR +12V. DEPENDING ON PRIMARY POWER.
6. +6V. WITH 6 OR 12V. PRIMARY POWER.
7. DOTTED CABLE KIT JUMPERS ARE USED ONLY WITH 6VDC CABLE KITS.
8. DASHED CABLE KIT JUMPERS ARE USED ONLY WITH 12VDC CABLE KITS.

PART NO. 63E836078
ISSUE - O 3/54-UM

Motorola®

THE "RESEARCH" LINE

UNIVERSAL UNI-CHANNEL RECEIVER CHASSIS
MOBILE STATION
152-174 MC

MODEL DESIGNATION	CHANNELS	FILTER	APPLICATION
TA140	1-Freq.	TU145	60 Kc. Channel Spacing
TA140-X	1-Freq.	K-9242	120 Kc. Channel Spacing
TA140-R2	2-Freq.	TU145	60 Kc. Channel Spacing
TA140-X-R2	2-Freq.	K-9242	120 Kc. Channel Spacing

1. DESCRIPTION

a. Design

The MOTOROLA Model TA140 Series Universal UNI-CHANNEL Receiver is a dual conversion superheterodyne FM receiver designed for operation within the 152-174 mc. band. The unit incorporates 15 tubes and 18 tuned circuits excluding the pre-tuned and sealed circuits of the IF wave filter. One RF amplifier, a single 1st IF stage and three 2nd IF stages comprise the basic amplification section of the receiver. Audio detection and amplification are performed by means of two limiter stages, an inductive type discriminator and two audio amplifiers. An AGC circuit is incorporated to maintain a constant input to the limiter stages under varying signal conditions. Undesirable noise cancellation is affected by means of a noise compensated type adjustable sensitivity squelch circuit.

MOTOROLA Universal UNI-CHANNEL units represent a progressive departure from conventional receiver design--a departure which was forced by the extreme technical requirements of adjacent channel operation. The stringent demands of close channel occupancy constitute a challenge which is now successfully met by the amazing performance of these new communications receivers.

NOMINAL PERFORMANCE SPECIFICATIONS

BASIC UNIT	TA140, TA140-R2	TA140-X, TA140-X-R2
MODEL APPLICATION	60 Kc. Channel Spacing	120 Kc. Channel Spacing
FREQUENCY RANGE	152-174 Mc.	
20 DB. QUIETING SENSITIVITY	Less than 0.5 microvolt; 50-72 ohms RF input impedance	Less than 0.55 microvolt; 50-72 ohms RF input impedance
SELECTIVITY	-100 db. at ±30 Kc.	-100 db. at ±120 Kc.
MODULATION ACCEPTANCE	±15 Kc. or more at - 6 db.	±15 Kc. or more at - 6 db.
SPURIOUS RESPONSE	All spurious and image responses are attenuated 100 db. or more.	
TEMPERATURE RANGE AND FREQUENCY STABILITY	Using crystal control, overall stability is maintained within ±.0025% of assigned center frequency from -30°C. to +60°C. ambient (+25°C. reference).	
SQUELCH	Noise compensated type; adjustable sensitivity of 0.25 microvolt. (U.S. Patent Pending)	
AUDIO OUTPUT	At least 1 watt to 3 ohm speaker	
TUBE COMPLEMENT AND FUNCTION	6AK5 - RF Amp. 12AT7 - 1st Osc.-Mult. No.1 12AT7 - 1st Osc.-Mult. No. 2 (2-Freq. only) 6AB4 - 1st Mixer 6BH6 - 1st IF Amp. 12AT7 - 2nd Osc. - Mixer 6BH6 - 2nd IF Amp. - 1 6BH6 - 2nd IF Amp. - 2	6BH6 - 2nd IF Amp. - 3 6C4 - 1st Limiter 6BJ6 - 2nd Limiter 6AL5 - Discriminator 6AB4 - Noise Amp. 6C4 - Noise Rect. 12AT7 - 1st Audio & Squelch 6AQ5 - Audio Power Amp.
NUMBER OF TUNED CIRCUITS	Total: 30 permeability tuned circuits (1-Freq) 31 permeability tuned circuits (2-Freq)	Total: 21 permeability tuned circuits (1-Freq) 22 permeability tuned circuits (2-Freq)
	Antenna, RF amplifier, and oscillator-multiplier stages include 7 (1-Freq) or 8 (2-Freq) tuned circuits. IF amp. and discriminator stages include 11 tuned circuits. IF filter includes remainder of tuned circuits.	

NOMINAL PERFORMANCE SPECIFICATIONS (Cont'd.)

FILTER TYPE	TU145 Permakay IF filter contains 12 plastic-cast tuned circuits.	K-9242 TRI-K IF filter contains 3 plastic-cast tuned circuits.
METERING	A single scale meter may be used with associated rotary selector switches and chassis mounted metering socket to check all circuits essential to tuning and servicing.	
PRIMARY POWER INPUT DRAIN	With Vibrator Power Supply - Operate: 7.0 amps. at 6 VDC; 3.5 amps. at 12 VDC Muted: 5.0 amps. at 6 VDC; 2.55 amps. at 12 VDC With Dynamotor Power Supply Operate: 6.5 amps. at 6 VDC; 3.6 amps. at 12 VDC Muted: 4.7 amps. at 6 VDC 2.6 amps. at 12 VDC	
DIMENSIONS	3-1/4" wide x 5-1/4" high x 15" long overall	
MOUNTING	10 inch housing	
WEIGHT	5 pounds	

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

b. Application

MOTOROLA 152-174 mc. Universal UNI-CHANNEL Receivers are available in two basic versions accommodating different channel width requirements. Receivers employing a TU145 PERMAKAY Filter are expressly applicable for normal adjacent channel applications in which channel spacing is restricted to within 60 Kc. Models of this category provide -100 db. of signal attenuation at ±30 Kc. Receiver employing a K-9242 TRI-K Filter (-x versions) are designed for applications where a -100 db. signal attenuation is not required at less than ±120 Kc.; i.e., for 120 Kc. channel spacing applications.

Two-frequency (-R2) models are available in all receiver versions. These receivers are identical to corresponding single-frequency models except for the addition of a second oscillator circuit. The two-frequency receivers are designed for operation with a frequency separation between channels as great as 240 Kc. without any change in nominal performance specifications. The RF circuits of two-frequency models should normally be peaked to the lower frequency.

Refer to the model chart on page one of this section for specific model identification.

Model TA140 Universal Receivers may be used with radio equipment operated from either a 6 VDC, or 12 VDC primary power source without any change of receiver circuitry whatsoever.

c. Chassis Complement

Chassis Designation	Basic Chassis		Coil Kit		Filter		Xtal Used IF	Xtal Used Control
	TU188	TU188-R2	TK187	TK187-R2	TU145	K-9242	G03	A17
TA140	X		X		X		X	X
TA140-X	X		X			X	X	X
TA140-R2		X		X	X		2	2
TA140-X-R2		X		X		X	2	2

NOTES

X: Signifies each item included or used with standard models.

2: Signifies two items used with standard models.

2. PRE-OPERATIONAL NOTES

Before placing the receiver in operation it is advisable to check that the unit is functioning properly. The receiver is tuned and adjusted for its exact operating frequency prior to shipment from the factory. Unless it has been handled roughly while in transit or otherwise abused or tampered with, the unit should require no further adjustment before placing it in service. If, for any reason, it becomes necessary for the receiver to be retuned, the alignment procedure described later in this section outlines the correct procedure. The following preliminary checks may be used to ascertain proper alignment and adjustment of the receiver.

a. Frequency Check

(1) Turn the equipment "on" and allow a 5 minute warm-up period.

(2) Connect a MOTOROLA Portable Test Set to the METER receptacle on the chassis.

(3) Radiate a signal from a transmitter which the receiver is normally intended to receive.

NOTE

Be certain that the remote transmitter is operating on the correct carrier frequency before readjusting the receiver.

(4) Check the discriminator balance against this frequency by placing the meter switch in position -4 or +4. If the reading is within ±1 microampere of zero, receiver alignment can be considered satisfactory.

If not within ±1 microampere of zero, adjust the Oscillator Coil, L 5, for a zero meter reading on position +4 or -4.

On two-frequency receivers, repeat the procedure with the remote station transmitting a signal on the second receiver frequency. Adjust the second Oscillator Coil, L 201, if necessary.

(5) Tune the antenna coil, L 1, for maximum meter reading in position 1 with a reasonably weak received signal.

b. Laboratory Sensitivity Check

Quieting signal is that input signal necessary to reduce the output noise, at speaker, 20 db. Quieting measurements should be made in a well shielded location in the absence of extraneous noises.

This measurement is important in that it indicates in one measurement that the unit is working normally.

The actual measurement is made by observing the noise voltage at the speaker without any carrier at the antenna. Sufficient carrier is then introduced at the antenna to reduce the output voltage to 1/10 its former value.

To measure the quieting signal accurately, a Model 80 Signal Generator or equivalent, and a MOTOROLA Portable Test Set are required. Employment of a VTVM or db. output meter suitable for accurate measurement of receiver audio output, is also recommended.

(1) Turn the signal generator "on" and stabilize by a "warm-up" period of 1-1/2 to 2 hours.

(2) Connect the meter plug from the Portable Test Set to the meter receptacle on the chassis.

(3) Place the REC-XMTR-0, 50 ua switch in the REC position and the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position on the Test Set.

(4) Connect the signal generator, adjusted to the desired carrier frequency to the antenna input connector using the coaxial lead and 6 db. pad. The exact carrier frequency will be indicated by a zero reading on the test set with the meter switch in position +4 or -4.

(5) Connect the output meter across the voice coil leads (terminals 1 and 2 on the terminal board of the power supply or adapter chassis). Note: If an output meter is not available, the Test Set may be used to measure receiver output by placing the Test Set selector switch in position 8. (Test Set measurements are purely relative and will not constitute actual output level readings.)

(6) Turn the SQUELCH control fully counterclockwise (off).

(7) With no signal input to the receiver (signal generator ATTENNUATOR control set for zero output) adjust the VOLUME control on the receiver chassis for 0.5 volts of noise output on the audio output meter. (Adjust for a reading of 10.0 if the test set is used for this measurement.)

(8) Adjust the output level of the signal generator until the receiver audio output is decreased 20 db. (to 0.05 volts on audio output meter) from the reading in step (7). Adjust for a reading of 1.0 if the Test Set is used for this measurement.

(9) Note the setting of the signal generator output control. This value (microvolts) is the 20 db. quieting sensitivity of the receiver.

3. PRE-ALIGNMENT NOTES

Before attempting alignment of the receiver, the following preliminary considerations should be noted.

a. Frequency Calculations

Receiver crystal, IF and/or carrier frequencies may be determined as follows:

f_c = carrier frequency

f_{o1} = 1st oscillator crystal frequency (dependent on f_c)

f_1 = 1st intermediate frequency (fixed) = 12 Mc.

f_2 = 2nd intermediate frequency (fixed) = 455 Kc.

f_{o2} = 2nd oscillator crystal frequency (fixed) = 12.455 Kc.

$$f_1 = f_c - 5f_{o1}$$

$$f_{o1} = \frac{f_c - f_1}{5}$$

$$f_2 = f_{o2} - f_1$$

b. Test Equipment

(1) Portable Equipment

A MOTOROLA P-8501-A Test Set, in conjunction with appropriate test crystals, will provide complete facilities for metering and/or aligning the receiver in the field. This instrument incorporates simplified meter switching, an expanded meter range, and a crystal controlled oscillator. The output frequency of the P-8501-A Test Set oscillator is determined by the control crystal inserted into either of the two crystal sockets provided. The oscillator is expressly designed for use with specific types of "RESEARCH" Line Transmitter control crystals and a unique 455 Kc. alignment crystal (available on separate order only).

When aligning a TA140 series receiver using a P-8501-A Test Set as a signal source, the following crystals should be used:

RF & 1st IF Alignment:

Use D03 or A02 Series type transmitter control crystal of the same operating frequency as the receiver. (Available on separate order if not used with associated transmitter).

2nd IF & Discriminator Alignment:

Use 455 Kc. Alignment Crystal. (Available for purchase by ordering Part Number 48A801965).

(2) Laboratory Equipment

The following test equipment or equivalents should be available for comprehensive bench alignment of the receiver:

(a) One (1) MOTOROLA Model P-8501-A Test Set with 455 Kc. Alignment Crystal (Part No. 48A801065).

NOTE

> If desired, a model 65B Measurements Corporation Signal Generator may be used in place of the P-8501-A Test Set as a signal source for 2nd IF alignment. When this generator is used, an 18, 000 resistor should be connected in series with the generator output lead. A Model 65B Generator or equivalent is required for complete stage measurement of the receiver (see paragraph 7). (DO NOT use Model 65B generator for discriminator alignment.)

(b) One (1) Model 80 Measurements Corporation Signal Generator (2 mc. -- 400 mc.) or equivalent, is used to produce the carrier frequency (152-174 mc.).

When applying a test signal to the grid of a tube a coaxial lead with a resistive termination should be used. A Measurements Corporation coaxial carrier output cable, Part No. 80-ZH4 (50 ohms impedance with 50 ohms termination) is most suitable for this purpose. When feeding a signal into an antenna circuit, use a coaxial lead with a 6 db. pad. A Measurements Corporation coaxial carrier output cable, Part No. 84-Z2-2 (50 ohms impedance) and an output matching pad, Part No. 80-ZH3 (6 db. loss) should be used for this application.

(c) One (1) power supply, preferably the unit which is normally used with the receiver being tested.

(d) One (1) alignment tool (MOTOROLA Part No. 66A835721).

c. MOTOROLA P-8501-A Test Set Switch Position and Corresponding Circuits

METERING SWITCH	CIRCUIT
11	2nd IF-3 Grid
2	1st Limiter Grid
3	No Connection
*+4, -4	Discriminator Output (Balance)
5	Discriminator Input
6	1st Oscillator Grid
7	No Connection
8	Audio Output Transformer

*The P-8501-A Test Set has +4 and -4 selector switch positions to permit an "up-scale" reading for discriminator balance adjustments.

d. Alignment Methods

IT IS RECOMMENDED THAT THE TEXT BE READ CAREFULLY BEFORE ATTEMPTING ANY ALIGNMENT ADJUSTMENTS.

Two detailed alignment procedures are provided in this text.

The first is a procedure using a MOTOROLA P-8501-A Test Set. This procedure permits receiver alignment in the field.

The second is a more comprehensive alignment for major bench testing, requiring the use of signal generator and/or a P-8501-A Test Set capable of producing an accruate 455 Kc. (2nd IF) signal and a second signal source capable of producing a 12 Mc. (1st IF) and 152-174 Mc. (RF) signals.

Following these two alignment procedures are general instructions for "reduction of ignition noise in mobile receivers" and a complete "stage measurements chart".

Alignment and gain measurements are made on FM receivers by observing, with a high resistance voltmeter or 1 megohm series compensated microammeter, (50-500 ua) the voltage or current developed at the grids of the various IF and limiter stages. Adjustment of the various tunable components is made to bring these readings to their optimum values. Stage gains can be measured by selecting a signal of an appropriate reference level, applying it to the stage under measurement, and comparing input to output level.

e. Two-Frequency Considerations

When aligning a two-frequency receiver, it is recommended that the receiver be aligned to the lower frequency.

4. ALIGNMENT USING A MOTOROLA P-8501-A TEST SET

a. Test Set Preliminary Adjustments for Discriminator and Second IF Alignment

(1) Plug the 455 Kc. Alignment Crystal into the crystal socket of the Test Set.

(2) Set the GRID CURRENT-METER-FIELD STRENGTH switch in the GRID CURRENT position.

(3) Connect the RF Probe Cable to one end of the Extension Cable. Connect the opposite end of the Extension Cable to the RF OUTPUT receptable on the Test Set.

(4) Place the Test Set ON-OFF switch in the ON position.

(5) Set the ATTENUATOR control for maximum output.

(6) Adjust the frequency ADJ. control for a maximum reading on the Test Set meter.

b. Alignment of Discriminator and Second IF Coils

(1) Plug the Test Set metering cable into the METER receptacle on the receiver.

(2) Lay the RF Probe Cable under the receiver chassis near pin 1 of Tube V 106 (2nd IF-1).

(3) Place the REC-XMTR-0 50 ua switch on the Test Set in the REC position and the GRID CURRENT-METER-FIELD STRENGTH switch in the METER position.

IMPORTANT

It is imperative that the following discriminator adjustment be made with extreme accuracy. Once adjusted, the discriminator setting should NOT be altered for the remainder of the alignment procedure.

(4) Adjust the secondary (top) of Discriminator Transformer T 1 for a zero (±0. 5 ua) reading with the Test Set meter switch in position +4 or -4.

(5) Place the meter selector switch in position 2 and adjust Coil L 16 for a maximum reading.

NOTE

Undesirable stage saturation may result if the test set signal is too strong. This condition may be recognized by a failure of the position 2 or 1 meter reading to change when signal input to the receiver is reduced or increased. For proper alignment, keep the test set ATTENUATOR control at such a setting that a further increase of output will always produce a linear increase of meter reading. This procedure should be adhered to throughout alignment of the 2nd IF, 1st IF, multiplier and RF Coils.

It should be noted that the ATTENUATOR control may reduce signal output to such an extent that the test set oscillator may cease functioning. If saturation cannot be avoided without reducing test set output to the "no oscillation" level, reduce the signal input to the receiver by increasing the distance between the RF probe cable and pin 1 of V 106.

(6) Adjust the Coil L 16 for a maximum reading with the meter switch in position 1 or 2.

(7) Adjust the Coil L 14 for a maximum reading with the meter switch in position 1 or 2.

(8) Upon completion of the preceding adjustments, turn the Test Set ON-OFF switch to OFF and remove the RF Probe Cable from the receiver.

c. Adjustment, First Oscillator

(1) Place the meter switch in position 6. A meter reading indicates activity of the first oscillator. Adjust Oscillator Coil L 5 for a maximum reading in position 6.

(2) Use the transmitter that is to be received under normal operating conditions and place the assigned carrier frequency on the air (frequency No. 1 on two-frequency receivers).

(3) Place the meter switch in position +4 or -4.

(4) Readjust Coil L 5 for zero (±0.5 ua) meter reading.

NOTE

Inability to obtain an indication of receiver quieting in the presence of an on-channel RF signal is evidence that IF and/or RF stages are noticeably detuned. If this condition exists, it is recommended that these stages be realigned by the method described in the COMPREHENSIVE ALIGNMENT PROCEDURE section of this text.

(5) For two-frequency receivers, place the frequency selector switch on the control unit in the F 2 position and adjust the Oscillator Coil L 201 for a maximum meter reading in position 6. With the external transmitter transmitting the No. 2 frequency signal, readjust Coil L 201 for zero (±0.5 ua) meter reading in position +4 or -4.

d. Test Set Preliminary Adjustments for First IF Alignment

(1) Place a transmitter type control crystal (D03, A02, or equivalent) of the same operating frequency as the receiver into the crystal socket on the Test Set.

NOTE

A DS1 or similar type series mode crystal will not operate properly with the P-8501-A Test Set and should not be used.

(2) Connect the RF OUT. receptacle on the Test Set to the ANT input of the receiver. When the receiver is assembled in the drawer unit, the Test Set may be connected to the ANT receptacle on the housing front panel using the Extension Cable supplied with the Test Set.

(3) Place the Test Set ON-OFF switch in the ON position.

(4) Set the Test Set ATTENUATOR control for maximum output.

(5) Place the GRID CURRENT-METER-FIELD STRENGTH switch in the GRID CURRENT position and check for a meter indication of proper Test Set oscillator grid current. If the meter indicates below 5 microamperes, check Test Set batteries for proper voltage and replace if necessary.

(6) Return the meter switch to the METER position and place the selector switch to position +4 or -4.

(7) Adjust the Test Set oscillator frequency for a zero (±0.5 ua) reading by means of the ADJ control.

(8) Place the meter switch in position 2 and peak the Test Set OSC TUNE control for maximum reading.

(9) Readjust the Test Set ADJ control for zero (±0.5 ua) reading in position +4 or -4.

e. Adjustments, First IF Coils

(1) With the meter switch remaining in position 2, adjust Coils L 13, L 12, L 11, L 10, L 9 and L 8 for maximum readings.

(2) Upon completion of the 1st IF Coil adjustments, maintain the Test Set connections and switch settings for alignment of the RF coils.

f. Adjustments, RF Circuits

(1) Adjust Oscillator Multiplier Coils L 6 and L 7, and RF Coils L 4, L 3, L 2 and L 1 for maximum reading in position 1 or 2.

(2) RF circuits of two frequency receivers should be peaked on the lower of the two frequencies.

5. COMPREHENSIVE ALIGNMENT PROCEDURE FOR LABORATORY BENCH TESTING

a. Preliminary

(1) Refer to page 7 for test equipment required.

(2) Connect the P-8501-A Test Set to the receiver METER receptacle.

b. Adjustment, Discriminator

It is imperative that the discriminator be adjusted to exactly 455 Kc. A P-8501-A Test Set in conjunction with a MOTOROLA 455 Kc. Alignment Crystal, will prove most excellent for this purpose. If a 455 Kc. Alignment Crystal is not available, a reliable frequency meter (secondary standard, BC221 or equivalent) may be used for accurate discriminator alignment. Once adjusted, the discriminator setting should NOT be altered for the remainder of the alignment procedure.

(1) Using a Test Set

(a) Refer to paragraph 4a. of the ALIGNMENT PROCEDURE USING A PORTABLE TEST SET for preliminary set-up of the test set for discriminator alignment.

(b) With the Test Set RF Probe Cable near pin 1 of Tube V 106, adjust the secondary (top) of Discriminator Transformer T 1 for a zero (±0.5 ua) reading with the selector switch in position +4 or -4.

(2) Using a Frequency Meter

(a) Set-up the frequency meter for an output of exactly 455 kc.

(b) With the frequency meter output lead near pin 1 of V 106, adjust the secondary (top) of Discriminator Transformer T 1 for a zero (±0.5 ua) reading with the Test Set selector switch in position +4 or -4.

c. Adjustment, Second IF Coils

(1) Keep the Test Set RF Probe Cable near pin 1 of tube V 106. If a Model 65B or equivalent Signal Generator is to be used for 2nd IF alignment, connect its output cable to pin 1 of V 106.

(2) With the test set or signal generator set for maximum output, adjust frequency to exactly 455 Kc. (zero reading in position +4 or -4).

(3) Adjust Coil L 16 for a maximum reading in position 2.

NOTE

Undesirable stage saturation may result if the test signal is too strong. This condition may be recognized by a failure of the position 2 or 1 meter reading to change when signal input to the receiver is reduced or increased. For proper alignment, keep the test signal at such a level that a further increase of signal output will always produce a linear increase of meter reading. This procedure should be adhered to throughout alignment of the 2nd IF, 1st IF, multiplier, and RF Coils,

It is to be noted that when a test set is used for 2nd IF alignment, the ATTENUATOR Control may reduce signal output to such an extent that the test set oscillator may cease functioning. If saturation cannot be avoided without reducing test set output to the "no-oscillation" level, reduce the signal input to the receiver by increasing the distance between the RF Probe Cable and pin 1 of V 106.

(4) Adjust Coil L 15 for a maximum reading in position 1 or 2.

(5) Adjust Coil L 14 for a maximum reading in position 1 or 2.

d. Adjustment, First IF Coils

(1) Connect the Model 80 or equivalent Signal Generator to the grid (pin 7) of V 105.

(2) Set the generator to 12 mc. as indicated on the generator scale. Set generator for maximum output.

(3) Readjust the generator for exactly 12 mc. output by resetting the frequency control for zero (±0.5 ua) reading in position +4 or -4.

(4) Connect the generator to the grid (pin 1) of 1st IF Amp. V 104.

(5) Adjust IF Coils L 13, L 12 and L 11 for a maximum reading in position 1 or 2.

(6) Connect the generator to the grid (pin 6) of 1st Mixer V 103.

(7) Adjust IF Coils L 10, L 9 and L 8 for a maximum reading in position 1 or 2.

e. Adjustment, First Oscillator

(1) Place the meter switch in position 6. A reading indicates activity of the first oscillator. Adjust Oscillator Coil L 5 for a maximum reading.

(2) For two-frequency receivers, place the frequency selector switch on the control unit in the F 2 position and adjust the Oscillator Coil L 201 for a maximum reading in position 6.

f. Adjustment, Multiplier and RF Coils

NOTE

RF circuits of two-frequency receivers should be peaked on the lower of the two frequencies.

(1) Set the signal generator to the operating frequency of the receiver as indicated on the generator scale. Set generator for maximum output.

(2) Readjust the generator for exact frequency by resetting the frequency control for zero (±0.5 ua) reading in position +4 or -4.

(3) Adjust Multiplier Coils L 6 and L 7 for a maximum reading in position 1 or 2.

(4) Using the coaxial lead and 6 db. pad, connect the generator to the ANTenna receptacle of the receiver.

(5) Using a minimum amount of output from the signal generator, adjust RF Coils L 4, L 3, L 2 and L 1 for a maximum meter reading in position 1 or 2.

6. ADJUSTMENT FOR REDUCTION OF IGNITION NOISE

Ignition noise balance adjustments should be made with the receiver installed in the mobile vehicle.

(1) Turn the equipment "ON" and allow it to warm-up for at least five minutes.

(2) Plug the P-8501-A Test Set into the METER receptacle on the receiver.

(3) Radiate a signal of the frequency of the receiver by means of a P-8501-A Test Set with D02 or A02 crystal; a Model 80 or equivalent Signal Generator; or a distant transmitter. The signal should be just strong enough to produce receiver quieting (20 to 30 db.).

(4) Turn up receiver VOLUME to a normal useable level.

(5) With the vehicle engine running and the Test Set selector switch in position 2, note the meter reading.

(6) Make a slight adjustment of 2nd IF Coils L 15 and L 14 for minimum audible ignition noise. This should be only a slight adjustment and should not decrease position 2 reading more than one-half microampere.

(7) If adjustment of the 2nd IF Coils does not prove effective, adjust any ONE of the 1st IF Coils L 11 to L 13 until ignition noise is substantially reduced.

CAUTION

> The 1st IF Coils are very sensitive and may only be adjusted a very slight amount without reducing receiver gain. When making ignition noise balance adjustments, be careful NOT to decrease position 2 reading more than one-half microampere.

(8) If satisfactory reduction of audible ignition noise cannot be obtained by the methods described in steps (6) and (7), the secondary winding (top) of Discriminator Transformer T 1 is probably not aligned to exactly 455 Kc. Check alignment of the discriminator with a reliable frequency source (such as a P-8501-A Test Set with 455 Kc. Alignment Crystal) and readjust as described in the previous alignment procedures.

7. STAGE MEASUREMENTS

Approx. Microvolt Input	Input To	Freq. In MC.	Meter Position	Meter Reading In UA. or DB.
Noise	Antenna	-	1	-0.5 to -5
Noise	Antenna	-	2	-10 to -30
Noise	Antenna	-	4	0 ±2
Noise	Antenna	-	5	-17 to -23
Noise	Antenna	-	6	-12 to -40
0.45	Antenna	F_c	*DB Meter	20 db. (quieting)
1.2	Antenna	F_c	1	-10
2.5 9	Pin 1 of V 101 1st RF	F_c F_c	*DB Meter 1	20 db. (quieting) -10
40 200	Pin 1 of V 103 1st Mixer	12.0 12.0	*DB Meter 1	20 db. (quieting) -10
3.5 40	Pin 1 of V 104 1st RF	12.0 12.0	*DB Meter 1	20 db. (quieting) -10
**3400	Filter	.455	1	-10
1000	Pin 1 of V 106 2nd IF-1	.455	1	-10
70000	Pin 1 of V 107 2nd IF-2	.455	1	-10

NOTE

A Model 80 Signal Generator with output cable (Measurements Corporation Pt. No. 80-XH4) was used when taking readings on V 101, V 103, and V 104. A Model 65B Signal Generator with a 30 ohm terminated output cable was used when taking all other readings except filter input reading.

*Refer to Laboratory Sensitivity Check on page 5 when making this measurement.

**This measurement serves as a filter check and is made through an 18,000 ohm matching resistor.

8. SCHEMATIC DIAGRAM PARTS LIST

a. MODELS: TA140 UNI-CHANNEL RECEIVER UNIT (152-174 MC)
60 KC Channel Spacing
TA140-X UNI-CHANNEL RECEIVER UNIT (152-174 MC)
120 KC Channel Spacing

REFERENCE:
Schematic Diagram
63E835289

(1) TU188 UNI-CHANNEL RECEIVER CHASSIS (Basic) 1-Freq.

Reference Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 101	21R38932	Fixed: ceramic; tubular; 24 mmf ±5%; 500 vdcw
C 102	21B893233	Fixed: ceramic; disc; 800 mmf GMV; 450 vdcw
C 103		Same as C 102
C 104		Same as C 102
C 105		Same as C 102
C 106	21A881064	Fixed: molded; tubular; .15 mmf (.14 mmf min. - .18 mmf max.)
C 107		Same as C 102
C 108		Same as C 106
C 109		Same as C 101
C 110	21B800801	Fixed: ceramic; disc; .0015 mf GMV +100% max.; 500 vdcw
C 111		Same as C 110
C 112		Same as C 110
C 113	21A801139	Fixed: ceramic; disc; .01 mf +80-20%; 600 vdcw
C 114	21R34985	Fixed: ceramic; tubular; 39 mmf ±5%; 500 vdcw
C 115		Same as C 101
C 116		Same as C 110
C 117		Same as C 110
C 118		Same as C 113
C 119		Same as C 106
C 120		Same as C 113
C 121		Same as C 113
C 122		Same as C 110
C 123		Same as C 106
C 124		Same as C 106
C 125		Same as C 110
C 126		Same as C 113
C 127		Same as C 110

Reference Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 128		Same as C 110
C 129		Same as C 106
C 130		Same as C 106
C 131		Same as C 101
C 132		Same as C 113
C 133		Same as C 113
C 134		Same as C 110
C 135	21R83198	Fixed: ceramic; tubular; 51 mmf ±5%; 500 vdcw
C 136		Same as C 135
C 137		Same as C 110
C 138		Same as C 113
C 139		Same as C 113
C 140	21R6693	Fixed: molded silver mica; 100 mmf ±5%; 500 vdcw
C 141	8A892986	Fixed: oil filled; tubular; .25 mf ±20%; 400 vdcw
C 142		Same as C 113
C 143		Same as C 135
C 144	21R401029	Fixed: ceramic; disc; .02 mf +80-20%; 500 vdcw
C 145		Same as C 110
C 146		Same as C 113
C 147		Same as C 110
C 148		Same as C 140
C 149		Same as C 110
C 150		Same as C 113
C 151		Same as C 135
C 152		Same as C 113
C 153		Same as C 110
C 154		Same as C 102
C 155	21K2793	Fixed: molded silver mica; 510 mmf ±5%; 300 vdcw
C 156	21K830159	Fixed: molded silver mica; 800 mmf ±3%; 100 vdcw
C 157		Same as C 101
C 158		Same as C 110
C 159		Same as C 113
C 160		Same as C 113
C 161	23K890624	Fixed: electrolytic; tubular; 1 section; 5 mf +100-15%; 150 vdcw
C 162		Same as C 110
C 163	8K85984	Fixed: oil filled; tubular; .02 mf ±20%; 400 vdcw
C 164		Same as C 113
C 165	21K83994	Fixed; molded; tubular; .5 mmf ±.1 mmf; 500 vdcw
C 166	21K811933	Fixed: molded silver mica; 200 mmf ±5%; 500 vdcw

Reference Symbol	Motorola Pt. No.	Description
		CAPACITOR-RESISTOR ASSEMBLY,
E 101	21K825528	Printed circuit; tubular; consisting of: One RESISTOR, fixed: carbon; 100, 000 ohm ±20% Two CAPACITOR, fixed: silver paint on ceramic form; 100 mmf ±20%; 300 vdcw
		CONNECTORS,
J 101	9A87120	Receptacle: female; single contact; round; molded mica filled phenolic base
J 102	9B86864	Receptacle: female; 11 contact; polarized; round; molded black plastic base; does not include 42A821428 RING, connector retainer, which must be ordered separately
		COIL, RF:
L 101	24A813612	Choke; 1.85 microhenries
		RESISTORS,
R 101	6R6031	Fixed: carbon; 100, 000 ohm ±10%; 1/2 w; ins.
R 102	6R6446	Fixed: carbon; 4.7 megohm ±10%; 1/2 w; ins.
R 103		Same as R 101
R 104	6R6377	Fixed: carbon; 470, 000 ohm ±10%; 1/2 w; ins.
R 105	6R3924	Fixed: carbon; 4700 ohm ±5%; 1/2 w; ins.
R 106	6R400056	Fixed: carbon; 47 ohm ±5%; 1/2 w; ins.
R 107	6R119172	Fixed: carbon; 820 ohm ±5%; 1/2 w; ins.
R 108	6R400066	Fixed: carbon; 220, 000 ohm ±5%; 1/2 w; ins.
R 109	6R5587	Fixed: carbon; 1 megohm ±5%; 1/2 w; ins.
R 110	6R6069	Fixed: carbon; 2200 ohm ±10%; 1/2 w; ins.
R 111		Same as R 110
R 112		Same as R 104
R 113	6R6398	Fixed: carbon; 150, 000 ohm ±10%; 1/2 w; ins.
R 114	6R6444	Fixed: carbon; 180, 000 ohm ±10%; 1/2 w; ins.
R 115	6R5622	Fixed: carbon; 10 megohm ±10%; 1/2 w; ins.
R 116	6R6117	Fixed: carbon; 5600 ohm ±10%; 1/2 w; ins.
R 117	6R6407	Fixed: carbon; 220, 000 ohm ±10%; 1/2 w; ins.
R 118	6R2097	Fixed: carbon; 6.8 megohm ±10%; 1/2 w; ins.
R 119	6R6074	Fixed: carbon; 68, 000 ohm ±10%; 1/2 w; ins.
R 120		Same as R 117
R 121		Same as R 109
R 122	6R400228	Fixed: carbon; 1.5 megohm ±5%; 1/2 w; ins.
R 123		Same as R 109
R 124	6R6378	Fixed: carbon; 56, 000 ohm ±10%; 1/2 w; ins.
R 125		Same as R 113

Reference Symbol	Motorola Pt. No.	Description
		RESISTORS,
R 126		Same as R 109
R 127		Same as R 109
R 128		Same as R 101
R 129	6R476014	Fixed: carbon; 18,000 ohm ±10%; 1/2 w; ins.
R 130	6R6397	Fixed: carbon; 22,000 ohm ±10%; 1/2 w; ins.
R 131	6R6326	Fixed: carbon; 100 ohm ±10%; 1/2 w; ins.
R 132		Same as R 117
R 133	6R6433	Fixed: carbon; 2.2 megohm ±10%; 1/2 w; ins.
R 134	6R400334	Fixed: carbon; 12 megohm ±10%; 1/2 w; ins.
R 135	6R6460	Fixed: carbon; 1.5 megohm ±10%; 1/2 w; ins.
R 136		Same as R 117
R 137	6R2096	Fixed: carbon; 330,000 ohm ±10%; 1/2 w; ins.
R 138		Same as R 101
R 139	6R5697	Fixed: carbon; 560,000 ohm ±10%; 1/2 w; ins.
R 140		Same as R 109
R 141	6R6497	Fixed: carbon; 3.3 megohm ±10%; 1/2 w; ins.
R 142		Same as R 133
R 143	6R490110	Fixed: carbon; 3.9 megohm ±10%; 1/2 w; ins.
R 144		Same as R 134
R 145		Same as R 124
R 146		Same as R 118
R 147	6R6434	Fixed: carbon; 27,000 ohm ±10%; 1/2 w; ins.
R 148	6R6475	Fixed: carbon; 680,000 ohm ±10%; 1/2 w; ins.
R 149		Same as R 101
R 150		Same as R 104
R 151		Same as R 109
R 152		Same as R 110
R 153	6R6048	Fixed: carbon; 47,000 ohm ±10%; 1/2 w; ins.
R 154	6R5631	Fixed: carbon; 120,000 ohm ±10%; 1/2 w; ins.
		TRANSFORMER, AF:
T 101	25K834770	Output; primary, 5000 ohm at 55 ma. to secondary, 3.2 ohm
		TUBES,
V 101	6AK5	Electron
V 102	12AT7	Electron
V 103	6AB4	Electron
V 104	6BH6	Electron
V 105		Same as V 102
V 106		Same as V 104
V 107		Same as V 104

Reference Symbol	Motorola Pt. No.	Description
		TUBES,
V 108		Same as V 104
V 109	6C4	Electron
V 110	6BJ6	Electron
V 111	6AL5	Electron
V 112		Same as V 103
V 113		Same as V 109
V 114		Same as V 102
V 115	6AQ5	Electron
		SOCKETS,
XV 101	9B834083	Tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 102	9B881243	Tube: female; 9 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
XV 103	9K87124	Tube: female; 7 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield
XV 104		Same as XV 103
XV 105		Same as XV 102
XV 106	9B87123	Tube: female; 7 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV 107		Same as XV 106
XV 108		Same as XV 106
XV 109		Same as XV 106
XV 110		Same as XV 106
XV 111		Same as XV 106
XV 112		Same as XV 106
XV 113		Same as XV 106
XV 114	9B86868	Tube: female; 9 contact; miniature; molded black phenolic base; saddle mounting; includes center shield
XV 115		Same as XV 106
		SOCKETS,
XY 101	9A30451	Crystal: female; 4 contact; square; molded mica filled bakelite base; chassis mounted
XY 102	9A817445	Crystal: female; 2 contact; rectangular; steatite base

(2) TK187 UNI-CHANNEL RECEIVER COIL KIT (152-174 MC) 1-Freq. P/O TU188

Reference Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 1	21R400072	Fixed: ceramic; tubular; 6 mmf ±.5 mmf; 500 vdcw; p/o L 1
C 2	21R87127	Fixed: ceramic; tubular; 36 mmf ±5%; 500 vdcw; p/o L 1
C 3		Same as C 1 except p/o L 2
C 4	21R490605	Fixed: ceramic; tubular; 12 mmf ±5%; 500 vdcw; p/o L 3
C 5		Same as C 1 except p/o L 4
C 6	21K835636	Fixed: ceramic; rectangular; 1.5 mmf ±.25 mmf; 500 vdcw; p/o L 5
C 7	21R490602	Fixed: ceramic; tubular; 10 mmf ±5%; 500 vdcw; p/o L 6
C 8	21R119296	Fixed: ceramic; tubular; 16 mmf ±5%; 500 vdcw; p/o L 7
C 9	21R114153	Fixed: ceramic; tubular; 47 mmf ±10%; 500 vdcw; p/o L 7
C 10	21R474573	Fixed: ceramic; tubular; 50 mmf ±5%; 500 vdcw; p/o L 8
C 11	21R475262	Fixed: ceramic; tubular; 15 mmf ±5%; 500 vdcw; p/o L 9
C 12	21R475261	Fixed: ceramic; tubular; 12 mmf ±5%; 500 vdcw; p/o L 10
C 13		Same as C 12 except p/o L 11
C 14		Same as C 11 except p/o L 12
C 15	21R890124	Fixed: ceramic; tubular; 10 mmf ±5%; 500 vdcw; p/o L 13
C 16		Same as C 2 except p/o L 14
C 17		Same as C 2 except p/o L 15
C 18		Same as C 2 except p/o L 16
C 19	21K811932	Fixed: molded silver mica; 240 mmf ±3%; 500 vdcw; p/o T 1
C 20	21R490601	Fixed: ceramic; tubular; 10 mmf ±5%; 500 vdcw; p/o T 1
C 21	21K811933	Fixed: molded silver mica; 200 mmf ±5%; 500 vdcw; p/o T 1
C 22		Same as C 21 except p/o T 1
C 23	21A801139	Fixed: ceramic; disc; .01 mf +80-20%; 600 vdcw; p/o T 1
C 24	21B800801	Fixed: ceramic; disc; .0015 mf GMV +100% max.; 500 vdcw; p/o T 1

Reference Symbol	Motorola Pt. No.	Description
		COILS,
L 1	24B824102	RF: Antenna; base stamped 102; includes 76A824120 CORE, adjustable tuning
L 2	24B824104	RF: Plate RF-1; base stamped 104; includes 76A824120 CORE, adjustable tuning
L 3	24B824106	RF: Plate RF-2; base stamped 106; includes 76A824120 CORE, adjustable tuning
L 4	24K824107	RF: Plate RF-3; base stamped 107; includes 76A824120 CORE, adjustable tuning
L 5	24B824114	RF: Oscillator Warping; base stamped 114; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 6	24K824105	RF: Oscillator Multiplier; base stamped 105; includes 76A824120 CORE, adjustable tuning
L 7	24K824103	RF: Oscillator Multiplier; base stamped 103; includes 76A824120 CORE, adjustable tuning
L 8	24B834778	IF: 12 MC IF-1; base stamped AA2; includes 76A824118 CORE, adjustable tuning
L 9	24B824109	IF: 12 MC IF-2; base stamped 109; includes 76A824118 CORE, adjustable tuning
L 10	24B824110	IF: 12 MC IF-3; base stamped 110; includes 76A824118 CORE, adjustable tuning
L 11	24K834779	IF: 12 MC IF-4; base stamped AA3; includes 76A824118 CORE, adjustable tuning
L 12	24K824111	IF: 12 MC IF-5; base stamped 111; includes 76A824118 CORE, adjustable tuning
L 13	24K824112	IF: 12 MC IF-6; base stamped 112; includes 76A824118 CORE, adjustable tuning
L 14	24K834777	IF: 455 KC IF-1; base stamped AA1; includes 46K891110 CORE, adjustable tuning; coded GREEN dot
L 15		Same as L 14 except 455 Kc IF-2
L 16		Same as L 14 except 455 Kc IF-3
		COIL,
T 1	1V822419	RF: Discriminator; base coded RED dot; includes two 76A821495 CORE, adjustable tuning; coded YELLOW dot
		RESISTORS,
R 1	6R6394	Fixed: carbon; 12,000 ohm ±10%; 1/2 w; ins; p/o L 2
R 2	6R401006	Fixed: carbon; 56,000 ohm ±5%; 1/2 w; ins; p/o L 5
R 3	6R5591	Fixed: carbon; 18,000 ohm ±10%; 1/2 w; ins; p/o L 6

Reference Symbol	Motorola Pt. No.	Description
		RESISTORS,
R 4	6R6398	Fixed: carbon; 150,000 ohm ±10%; 1/2 w; ins; p/o L 8
R 5	6R6031	Fixed: carbon; 100,000 ohm ±10%; 1/2 w; ins; p/o L 11
R 6	6R6048	Fixed: carbon; 47,000 ohm ±10%; 1/2 w; ins; p/o L 14
R 7		Same as R 6 except p/o L 15
R 8		Same as R 6 except p/o L 16
R 9	6R6428	Fixed: carbon; 6800 ohm ±10%; 1/2 w; ins; p/o T 1
R 10	6R6397	Fixed: carbon; 22,000 ohm ±10%; 1/2 w; ins; p/o T 1
R 11	6R6407	Fixed: carbon; 220,000 ohm ±10%; 1/2 w; ins; p/o T 1
R 12	6R6433	Fixed: carbon; 2.2 megohm ±10%; 1/2 w; ins; p/o T 1

b. MODELS: TA140-R2 RECEIVER UNIT (152-174 MC) 2-Freq.
(60 KC Channel Spacing)
TA140X-R2 RECEIVER UNIT (152-174 MC) 2-Freq.
(120 KC Channel Spacing)

REFERENCE:
Schematic Diagram
63E835299

NOTE

The TA140-R2 Receiver Unit, 2-Frequency series Schematic Diagram Parts List is the same as the TA140 Receiver Unit, 1-Frequency series Parts List except for the addition of the following components, referenced in the 200 series symbols

(1) TU188-R2 UNI-CHANNEL RECEIVER CHASSIS (Basic) 2-Freq.

Reference Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 201		P/O TK187-R2 Coil Kit Section
C 202	21B800801	Fixed: molded; tubular; .15 mmf (.14 mmf min. - .18 mmf max.)
C 203		Same as C 202
C 204	21R34985	Fixed: ceramic; tubular; 39 mmf ±5%; 500 vdcw
C 205	21A801139	Fixed: ceramic; disc; .01 mf +80-20%; 600 vdcw

Reference Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 206		Same as C 205
C 207	21R38932	Fixed: ceramic; tubular; 24 mmf ±5%; 500 vdcw
C 208		Same as C 202
C 209		Same as C 205
C 210		Same as C 202
C 211		P/O TK187-R2 Coil Kit Section
		COILS,
L 201		P/O TK187-R2 Coil Kit Section
L 202	24A813612	RF: Choke; 1.85 microhenries
L 203		P/O TK187-R2 Coil Kit Section
		RESISTORS,
R 201		P/O TK187-R2 Coil Kit Section
R 202	6R3924	Fixed: carbon; 4700 ohm ±5%; 1/2 w; ins.
R 203	6R400056	Fixed: carbon; 47 ohm ±5%; 1/2 w; ins.
R 204	6R119172	Fixed: carbon; 820 ohm ±5%; 1/2 w; ins.
R 205	6R400066	Fixed: carbon; 220,000 ohm ±5%; 1/2 w; ins.
R 206	6R5587	Fixed: carbon; 1 megohm ±5%; 1/2 w; ins.
R 207		P/O TK187-R2 Coil Kit Section
		TUBE,
V 201	12AT7	Electron
		SOCKET,
XV 201	9B881243	Tube: female; 9 contact; miniature; molded mica filled phenolic base; saddle mounting; includes center shield and tube shield base
		SOCKET,
XY 201	9A30451	Crystal: female; 4 contact; square; molded mica filled bakelite base; chassis mounted

(2) TK187-R2 RECEIVER COIL KIT (152-174 MC) 2-Freq. P/O TU188-R2

Reference Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 201	21K835636	Fixed: ceramic; rectangular; 1.5 mmf ±.25 mmf 500 vdcw; p/o L 201
C 211	21R400404	Fixed: ceramic; tubular; 4 mmf ±.5 mmf; 500 vdcw; p/o L 203

Reference Symbol	Motorola Pt. No.	Description
		COILS, RF:
L 201	24B824114	Oscillator Warping; base stamped 114; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 203	24K835379	Oscillator Multiplier; base stamped AB2; includes 76A824120 CORE, adjustable tuning; replaces L 6 Coil in 1-Frequency Parts List
		RESISTORS,
R 201	6R401006	Fixed: carbon; 56,000 ohm ±5%; 1/2 w; ins. p/o L 201
R 207	6R488095	Fixed: carbon; 18,000 ohm ±5%; 1/2 w; ins. p/o L 203

c. FILTERS (p/o All Receiver Models)

Reference Symbol	Motorola Pt. No.	Description
	1U831456	TU145 PERMAKAY FILTER; used only on models TA140, TA140-R2
	1U820043	K-9242 TRI-K FILTER; used only on models TA140-X, TA140-X-R2

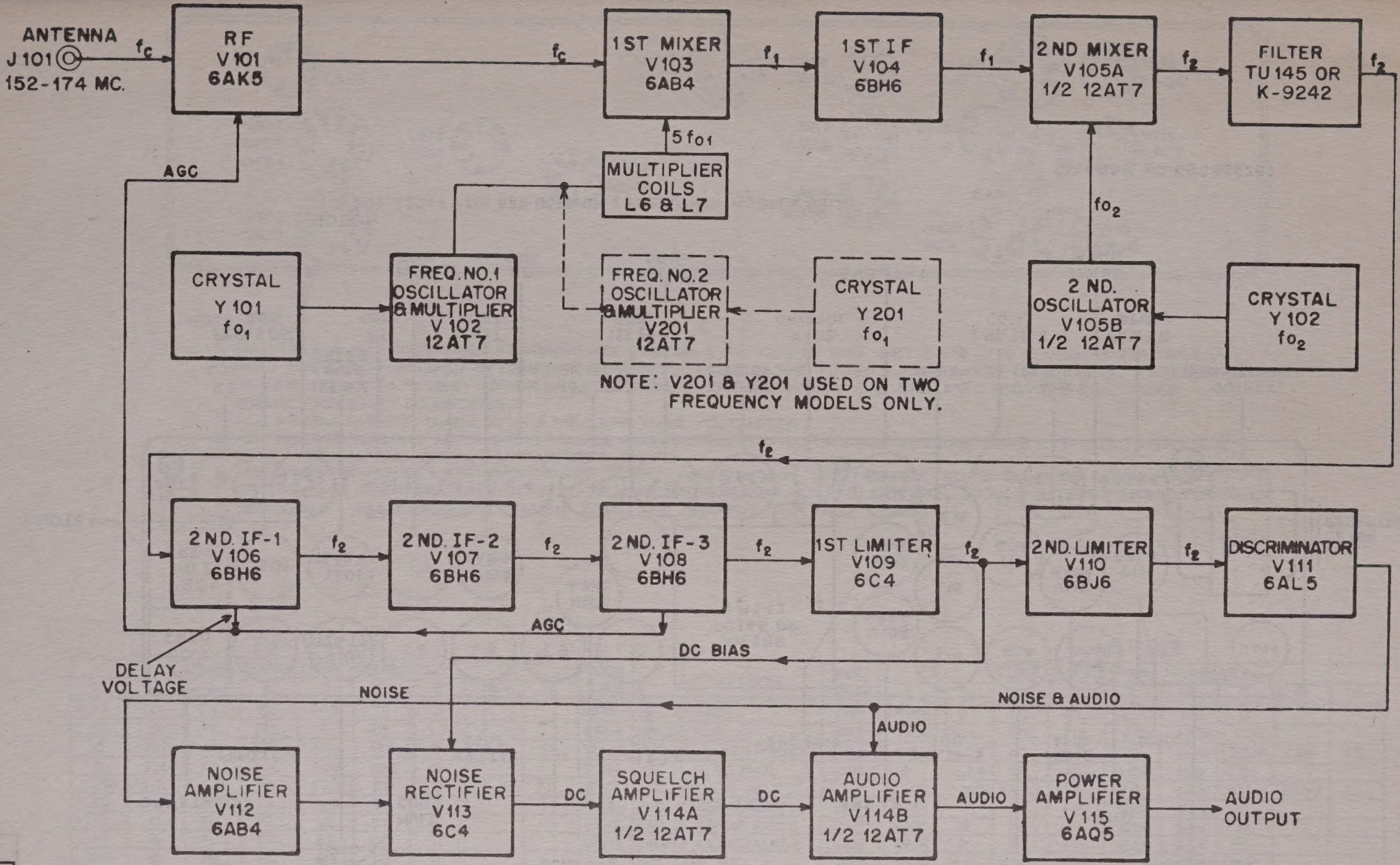
d. CRYSTALS

NOTE

CRYSTAL UNITS are not part of the Receiver Unit but are part of the overall model and must be ordered separately.

Reference Symbol	Motorola Pt. No.	Description
		CRYSTAL UNITS,
Y101	1U836539	Quartz: Receiver Control; 26.4 - 32.4 mc.; MOTOROLA Type A17; when ordering frequency must be specified
Y 102	1U830014	Quartz: Receiver IF; 12.45500 MC: MOTOROLA Type G03
Y 201		Same as Y 101 except used only for 2-frequency operation

MOTOROLA BLOCK DIAGRAM
MODEL TA140 SERIES, 152-174 MC.
UNIVERSAL UNI-CHANNEL RECEIVER


ANTENNA
J 101
152-174 MC.
f_c
RF
V 101
6AK5
f_c
1ST MIXER
V 103
6AB4
f_1
1ST IF
V 104
6BH6
f_1
2ND MIXER
V105A
1/2 12AT7
f_2
FILTER
TU 145 OR
K-9242
f_2
AGC
5 f_{o1}
MULTIPLIER
COILS
L6 & L7
fo_2
CRYSTAL
Y 101
fo_1
FREQ. NO.1
OSCILLATOR
& MULTIPLIER
V 102
12AT7
FREQ. NO.2
OSCILLATOR
& MULTIPLIER
V201
12AT7
CRYSTAL
Y 201
fo_1
2 ND.
OSCILLATOR
V105B
1/2 12AT7
CRYSTAL
Y 102
fo_2
f_2
2 ND. IF-1
V 106
6BH6
f_2
2 ND. IF-2
V 107
6BH6
f_2
2 ND. IF-3
V 108
6BH6
f_2
1ST LIMITER
V109
6C4
f_2
2ND. LIMITER
V110
6BJ6
f_2
DISCRIMINATOR
V111
6AL5
AGC
DELAY
VOLTAGE
DC BIAS
NOISE
NOISE & AUDIO
AUDIO
NOISE
AMPLIFIER
V112
6AB4
NOISE
RECTIFIER
V113
6C4
DC
SQUELCH
AMPLIFIER
V114A
1/2 12AT7
DC
AUDIO
AMPLIFIER
V114B
1/2 12AT7
AUDIO
POWER
AMPLIFIER
V 115
6AQ5
AUDIO
OUTPUT

NOTE: V201 & Y201 USED ON TWO FREQUENCY MODELS ONLY.

DIAGRAM NO. 63C835286

LEGEND:

f_c = CARRIER FREQUENCY = 152-174 MC.

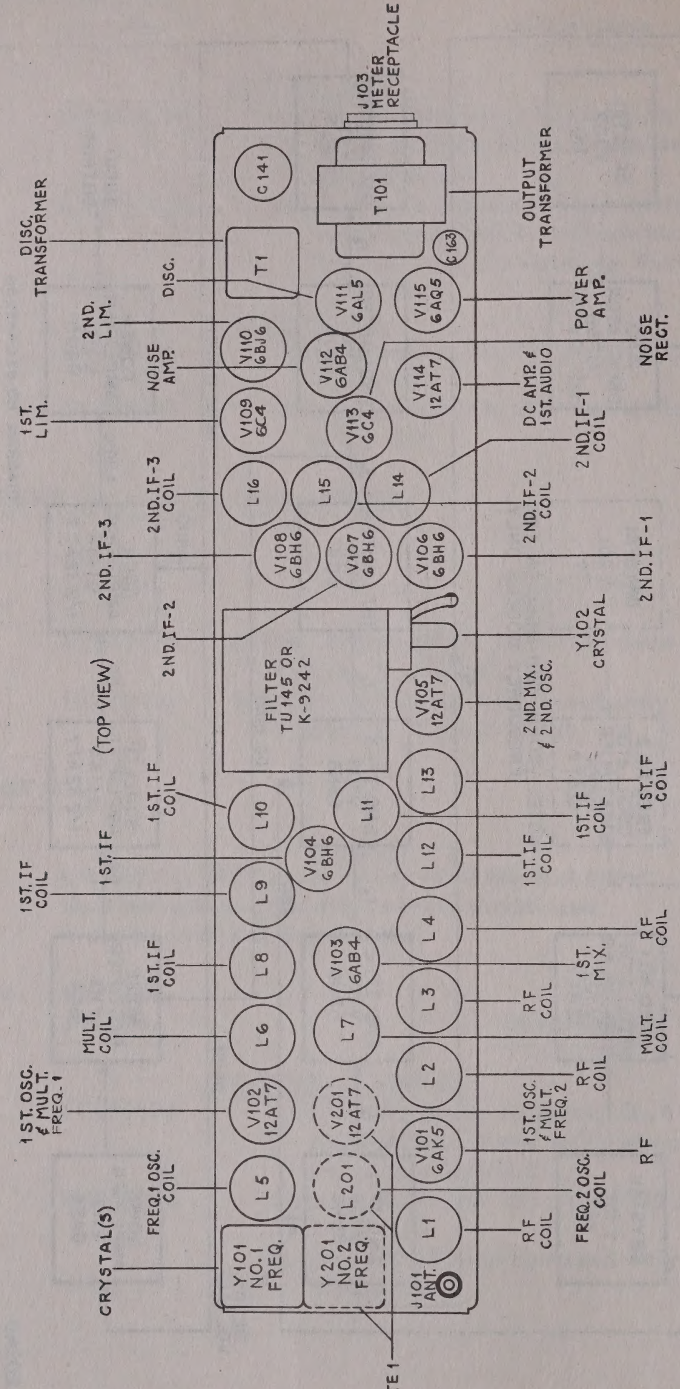
f_{o1} = 1ST. OSCILLATOR FREQUENCY = $\frac{f_c - f_1}{5}$ = 28.0-32.4 MC.

f_1 = 1ST. INTERMEDIATE FREQUENCY = $f_c - 5 f_{o1}$ = 12 MC.

f_2 = 2ND. INTERMEDIATE FREQUENCY = $f_{o2} - f_1$ = 455 KC.
f_{o2} = 2ND. OSCILLATOR FREQUENCY = 12.455 MC.

PART NO. 63C835286
ISSUE - O 3/54-UM

MOTOROLA PARTS LOCATION DETAIL
MODEL TA140 SERIES, 152-174 MC.
UNIVERSAL UNI-CHANNEL RECEIVER


(TOP VIEW)
J103 METER RECEPTACLE
DISC. TRANSFORMER
OUTPUT TRANSFORMER
C141
T101
T1
C163
DISC.
2ND. LIM.
NOISE AMP.
1ST. LIM.
V111 6AL5
V115 6AQ5
POWER AMP.
V110 6BJ6
V112 6AB4
V114 12AT7
NOISE RECT.
DC AMP. & 1ST. AUDIO
V109 6C4
V113 6C4
2ND. IF-1 COIL
2ND. IF-3 COIL
L16
L15
L14
2ND. IF-2 COIL
2ND. IF-3
V108 6BH6
V107 6BH6
V106 6BH6
2ND. IF-1
2ND. IF-2
FILTER TU145 OR K-9242
Y102 CRYSTAL
V105 12AT7
2ND. MIX. & 2ND. OSC.
1ST. IF COIL
L10
L11
L13
1ST. IF COIL
1ST. IF
V104 6BH6
L12
1ST. IF COIL
1ST. IF COIL
L9
1ST. IF COIL
L8
V103 6AB4
L4
1ST. MIX.
RF COIL
MULT. COIL
L6
L7
L3
RF COIL
MULT. COIL
1ST. OSC. & MULT. FREQ. 1
V102 12AT7
V201 12AT7
L2
RF COIL
1ST. OSC. & MULT. FREQ. 2
FREQ. 1 OSC. COIL
L5
L201
V101 6AK5
RF
FREQ. 2 OSC. COIL
CRYSTAL(S)
Y101 NO. 1 FREQ.
Y201 NO. 2 FREQ.
L1
RF COIL
J101 ANT.
NOTE 1

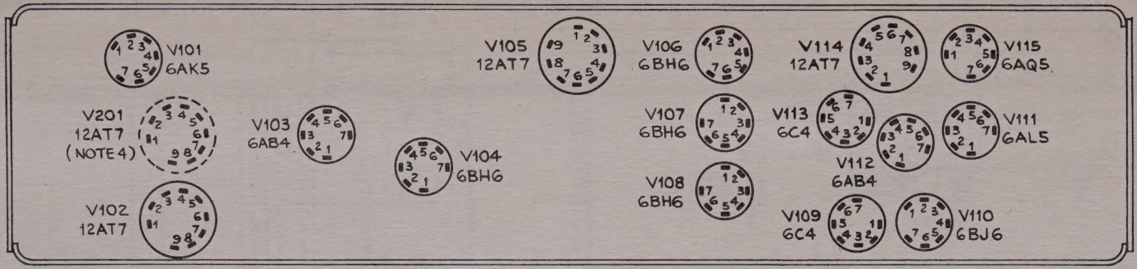
NOTE 1:
Y201, L201 & V201 ARE USED ON 2 FREQUENCY MODELS ONLY.

DIAGRAM NO. 69C835287

PART NO. 69C835287
ISSUE - O 3/54-UM

MOTOROLA VOLTAGE & RESISTANCE DIAGRAM
MODEL TA140 SERIES, 152-174 MC.
UNIVERSAL UNI-CHANNEL RECEIVER

BOTTOM VIEW



NOTES:

1. ALL VOLTAGE AND RESISTANCE READINGS ARE NOMINAL; B+ VOLTAGE MAY VARY ±10%, THE REMAINING READINGS MAY VARY ±20% DEPENDING UPON COMPONENT PART TOLERANCES AND POWER SUPPLY MODEL VARIATIONS. VOLTAGES TO BE MEASURED WITH PRIMARY POWER INPUT VOLTAGE OF APPROXIMATELY 6.6 VDC, 13.2 VDC OR 117 VAC UNDER NORMAL "RECEIVE" CONDITIONS.
2. ALL MEASUREMENTS TAKEN WITH A VACUUM TUBE VOLTMETER.
3. ALL VOLTAGE READINGS ARE POSITIVE (UNLESS OTHERWISE SPECIFIED) AND ARE MEASURED WITH RESPECT TO GROUND.
4. V201 USED ON TWO FREQUENCY MODELS ONLY.
5. ALL MEASUREMENTS MADE WITH POWER SUPPLY AND CONTROL UNIT CONNECTED TO RECEIVER (WHEN USING A CONTROL UNIT INCORPORATING A DC TYPE VOLUME CONTROL, THE VOLUME CONTROL SHOULD BE SET TO A MID POSITION).
6. RESISTANCE MEASUREMENTS TAKEN WITH THE SUPPLY VOLTAGE "OFF."

VOLTAGE

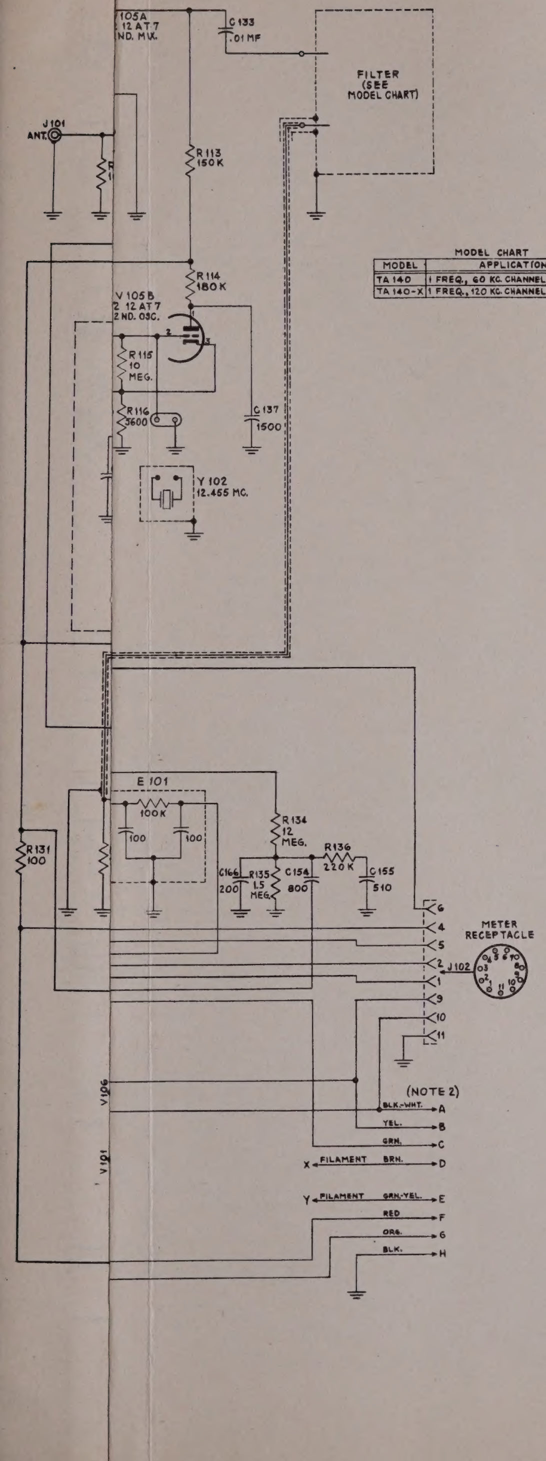
RESISTANCE

	TUBE SOCKET PIN NUMBERS									TUBE TYPE	APPLICATION	REF. SYMBOL	TUBE SOCKET PIN NUMBERS									
	1	2	3	4	5	6	7	8	9				1	2	3	4	5	6	7	8	9	
	-.27	0	FIL.	FIL.	145	75	0			6AK5	1ST. RF AMP.	V101	5.8MEG.	0	FIL.	FIL.	30K	110	0			
	72	0	FIL.	FIL.	0	.01	1.7			6AB4	1ST. MIXER	V103	150K	N.C.	FIL.	FIL.	N.C.	470K	1.7K			
	50	-2.7	.16	FIL.	FIL.	145	0	2.5	FIL.	12AT7	1ST. OSC. & MULT. (FREQ.1)	V102	68K	4.7K	47	FIL.	FIL.	36K	200K	680	FIL.	
	0	2.4	FIL.	FIL.	100	100	0			6BH6	1ST. IF 12 MC AMP.	V104	0	2.2K	FIL.	FIL.	110K	110K	0			
	60	0.2	1.3	FIL.	FIL.	86	0	1.7	FIL.	12AT7	2ND. MIXER & 2ND.OSC.	V105	280K	10 MEG.	5600	FIL.	FIL.	240K	470K	2200	FIL.	
	-.25	0	FIL.	FIL.	56	56	0			6BH6	2ND. IF 455KC AMP. 1	V106	220K	0	FIL.	FIL.	68K	68K	0			
	-.14	0	FIL.	FIL.	52	52	0			6BH6	2ND. IF 455KC AMP. 2	V107	68K	0	FIL.	FIL.	68K	68K	0			
	-.40	0	FIL.	FIL.	57	60	0			6BH6	2ND. IF 455KC AMP. 3	V108	200K	0	FIL.	FIL.	68K	68K	FIL.			
	50	0	FIL.	FIL.	50	-13	0			6C4	1ST. LIMITER	V109	150K	N.C.	FIL.	FIL.	150K	50K	0			
	-22	0	FIL.	FIL.	90	82	0			6BJ6	2ND. LIMITER	V110	90K	0	FIL.	FIL.	27K	40K	0			
	0	-60	FIL.	FIL.	-10	-.02	-56			6AL5	DISCRIMINATOR	V111	0	200K	FIL.	FIL.	400K	N.C.	200K			
**	40	-9	0	FIL.	FIL.	182	24	50	FIL.	12AT7	AUDIO & SQUELCH	V114	500K	7.5MEG.	0	FIL.	FIL.	78K	7MEG.	20K	FIL.	
*	13	-.68	0	FIL.	FIL.	200	8	41	FIL.													
**	180	200	FIL.	FIL.	0	-.15	24			6AB4	NOISE AMP.	V112	500K	27K	FIL.	FIL.	N.C.	300K	0			*
*	106	200	FIL.	FIL.	0	-7.0	0						500K	27K	FIL.	FIL.	N.C.	300K	8.5K			**
	-20	-.01	FIL.	FIL.	-20	-20	-11			6C4	NOISE RECTIFIER	V113	2MEG.	N.C.	FIL.	FIL.	2MEG.	2MEG.	5.4MEG.			
	-10.2	0	FIL.	FIL.	195	200	-10.2			6AQ5	POWER AMP.	V115	1MEG.	0	FIL.	FIL.	30K	30K	1MEG.			
	50	-2.7	.16	FIL.	FIL.	145	0	2.5	FIL.	12AT7	1ST. OSC. & MULT. (FREQ.2)	V201 NOTE 4	68K	4.7K	47	FIL.	FIL.	36K	200K	680	FIL.	

* TIGHTLY SQUELCH (FULLY CLOCKWISE)
** OPEN SQUELCH (FULLY COUNTERCLOCKWISE)

PART NO. 63D835288
ISSUE - O 3/54-UM

MOTOROLA SCHEMATIC DIAGRAM
MODEL TA140 SERIES, 1-FREQ., 152-174 MC.
UNIVERSAL UNI-CHANNEL RECEIVER


105A
12 AT 7
ND. MIX.
C 133
.01 MF
FILTER
(SEE
MODEL CHART)
J101
ANT.
R 113
150 K
R 114
180 K
V 105 B
2 12 AT 7
2 ND. OSC.
R 115
10
MEG.
R 116
3600
C 137
1500
Y 102
12.455 MC.
E 101
100 K
100
100
R 134
12
MEG.
R136
220 K
C155
510
C166
200
R135
1.5
MEG.
C154
800
R131
100
METER
RECEPTACLE
J102
V106
V101
(NOTE 2)
BLK.-WHT.
YEL.
GRN.
X FILAMENT BRN.
Y FILAMENT GRN.-YEL.
RED
ORG.
BLK.
A
B
C
D
E
F
G
H

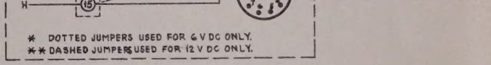
MODEL CHART

MODEL	APPLICATION	FILTER TYPE
TA 140	1 FREQ., 60 KC. CHANNEL SPACING	TU 145
TA 140-X	1 FREQ., 120 KC. CHANNEL SPACING	K-9242

NOTES:

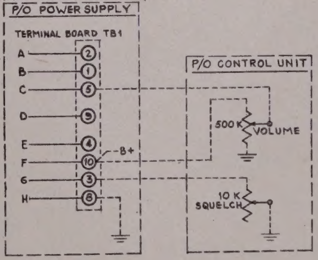
1. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, ± 10 %,
   1/2 WATT. K = 1000 OHMS.
   CAPACITOR VALUES ARE IN MICROMICROFARADS.
2. POWER AND CONTROL LEADS A THRU H ARE WIRED TO THE TERMINAL BOARD OF EITHER THE ADAPTER CHASSIS OR POWER SUPPLY DEPENDING UPON THE SPECIFIC APPLICATION OF THE RECEIVER. REFER TO CONNECTION DETAIL NO. 1 OR NO. 2 FOR RESPECTIVE TERMINAL CONNECTIONS. (LETTERS A THRU H ARE FOR REFERENCE PURPOSES ONLY.)
3. CRYSTAL HEATER CONNECTED TO X FILAMENT BUS FOR ALL APPLICATIONS EXCEPT WHEN THE RECEIVER IS USED WITH A 12VDC DYNAMOTOR TYPE POWER SUPPLY. FOR 12 VOLT DYNAMOTOR APPLICATIONS, THE CRYSTAL HEATER IS CONNECTED TO TERMINAL 9 OF THE ADAPTER CHASSIS BY MEANS OF THE BLU. JUMPER SUPPLIED WITH THE ADAPTER CHASSIS.
4. HEATER TYPE CRYSTALS USED ON T43G & T53G SERIES MOBILE STATIONS ONLY.

CONNECTION DETAIL NO. 1 (NOTE 2)


PARTIAL DIAGRAM OF ADAPTER CHASSIS
TERMINAL BOARD TB1
A
B
C
D
E
F
G
H
2
1
5
13
9
14
10
3
15
82 K
NOTE 3
BLU.
*
**
7
6
2
1
3
11
TO SPKR.
20
VOLUME
P/O CONTROL UNIT
10 K
SQUELCH

* DOTTED JUMPERS USED FOR 6 V DC ONLY.
** DASHED JUMPERS USED FOR 12 V DC ONLY.

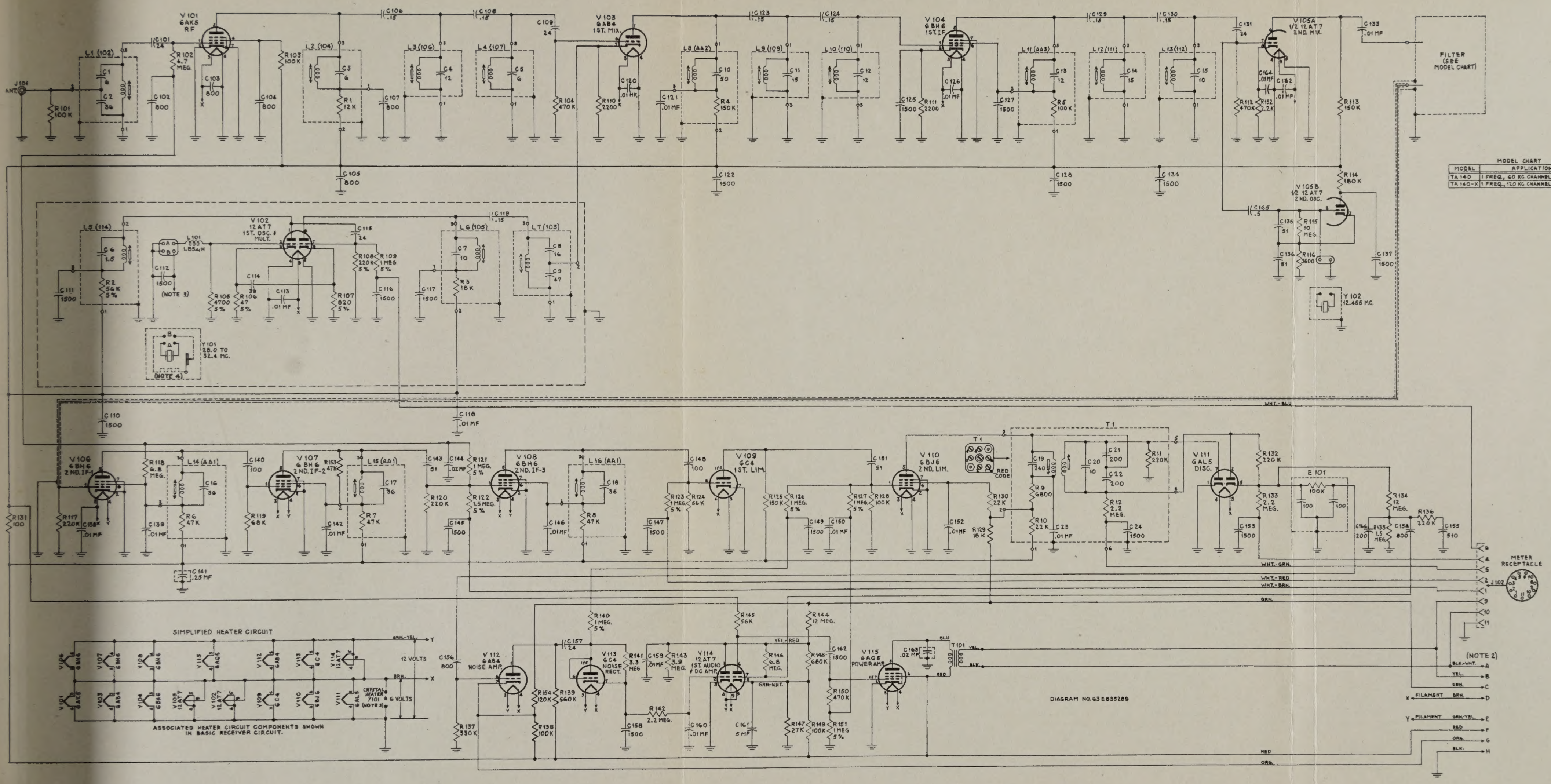
CONNECTION DETAIL NO. 2 (NOTE 2)


P/O POWER SUPPLY
TERMINAL BOARD TB1
A
B
C
D
E
F
G
H
2
1
5
9
4
10
3
8
B+
P/O CONTROL UNIT
500 K
VOLUME
10 K
SQUELCH

PART NO. 63E835289
ISSUE - 0 3/54-UM

MOTOROLA SCHEMATIC DIAGRAM
MODEL TA140 SERIES, 1-FREQ., 152-174 MC.
UNIVERSAL UNI-CHANNEL RECEIVER

TU 188 RECEIVER CHASSIS (BASIC)


J101 ANT.
V101 6AK5 RF
V103 6AB4 1ST. MIX.
V104 6BH6 1ST. I.F.
V105A 1/2 12AT7 2ND. MIX.
V105B 1/2 12AT7 2ND. OSC.
FILTER (SEE MODEL CHART)
Y102 12.455 MC.
V102 12AT7 1ST. OSC. & MULT.
L101 500 1.85μH
Y101 28.0 TO 32.4 MC.
(NOTE 4)
(NOTE 3)
V106 6BH6 2ND. IF-1
V107 6BH6 2ND. IF-2
V108 6BH6 2ND. IF-3
V109 6C4 1ST. LIM.
V110 6BJ6 2ND. LIM.
V111 6AL5 DISC.
T1
E101
RED CODE
METER RECEPTACLE
J102
WHT.-BLU
WHT.-GRN.
WHT.-RED
WHT.-BRN.
GRN.
SIMPLIFIED HEATER CIRCUIT
12 VOLTS
6 VOLTS
CRYSTAL HEATER Y101 (NOTE 3)
ASSOCIATED HEATER CIRCUIT COMPONENTS SHOWN IN BASIC RECEIVER CIRCUIT.
V112 6AB4 NOISE AMP.
V113 6C4 NOISE RECT.
V114 12AT7 1ST. AUDIO / DC AMP.
V115 6AQ5 POWER AMP.
T101
YEL.
BLK.
BLU
RED
(NOTE 2)
BLK.-WHT
GRN.
FILAMENT
BRN.
GRN.-YEL.
ORG.
DIAGRAM NO. 63E835289

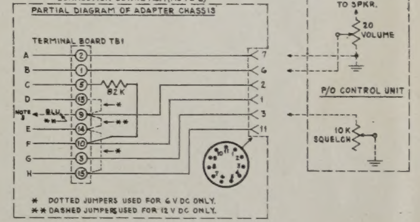
MODEL CHART

MODEL	APPLICATION	FILTER TYPE
TA 140	1 FREQ., 60 KC. CHANNEL SPACING	TU 145
TA 140-X	1 FREQ., 120 KC. CHANNEL SPACING	K-9242

NOTES:

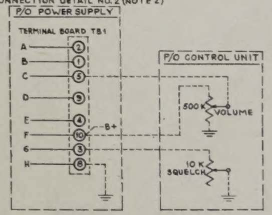
1. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, ± 10 %,
   1/2 WATT. K=1000 OHMS.
   CAPACITOR VALUES ARE IN MICROMICROFARADS.
2. POWER AND CONTROL LEADS A THRU H ARE WIRED TO THE TERMINAL BOARD OF EITHER THE ADAPTER CHASSIS OR POWER SUPPLY DEPENDING UPON THE SPECIFIC APPLICATION OF THE RECEIVER. REFER TO CONNECTION DETAIL NO. 1 OR NO. 2 FOR RESPECTIVE TERMINAL CONNECTIONS. (LETTERS A THRU H ARE FOR REFERENCE PURPOSES ONLY.)
3. CRYSTAL HEATER CONNECTED TO X FILAMENT BUS FOR ALL APPLICATIONS EXCEPT WHEN THE RECEIVER IS USED WITH A 12VDC DYNAMOTOR TYPE POWER SUPPLY. FOR 12 VOLT DYNAMOTOR APPLICATIONS, THE CRYSTAL HEATER IS CONNECTED TO TERMINAL 9 OF THE ADAPTER CHASSIS BY MEANS OF THE BLU JUMPER SUPPLIED WITH THE ADAPTER CHASSIS.
4. HEATER TYPE CRYSTALS USED ON T43G & T53G SERIES MOBILE STATIONS ONLY.

CONNECTION DETAIL NO. 1 (NOTE 2)


PARTIAL DIAGRAM OF ADAPTER CHASSIS
TERMINAL BOARD TB1
A
B
C
D
NOTE 3
BLU
E
F
G
H
82 K
7
6
2
1
3
11
TO SPKR.
20 VOLUME
P/O CONTROL UNIT
10 K SQUELCH

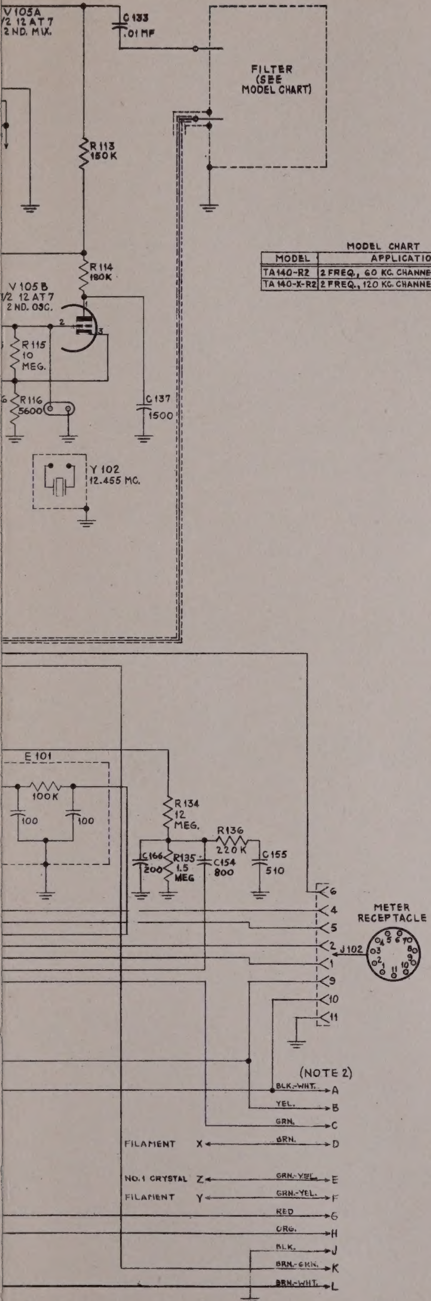
* DOTTED JUMPERS USED FOR 6 V DC ONLY.
** DASHED JUMPERS USED FOR 12 V DC ONLY.

CONNECTION DETAIL NO. 2 (NOTE 2)


P/O POWER SUPPLY
TERMINAL BOARD TB1
A
B
C
D
E
F
6
H
B+
P/O CONTROL UNIT
500 K VOLUME
10 K SQUELCH

PART NO. 63E835289
ISSUE - O 3/54-UM

MOTOROLA SCHEMATIC DIAGRAM
MODEL TA140 SERIES, 2-FREQ., 152-174 MC.
UNIVERSAL UNI-CHANNEL RECEIVER


V105A
1/2 12AT7
2ND. MIX.
C133
.01 MF
FILTER
(SEE
MODEL CHART)
R113
150K
R114
180K
V105B
1/2 12AT7
2ND. OSC.
2
3
R115
10
MEG.
R116
5600
C137
1500
Y102
12.455 MC.
E101
100K
100
100
R134
12
MEG.
R136
220K
C166
200
R135
1.5
MEG
C154
800
C155
510
6
4
5
2
1
9
10
11
J102
METER
RECEPTACLE
(NOTE 2)
BLK.-WHT.
A
YEL.
B
GRN.
C
FILAMENT X
BRN.
D
NO.1 CRYSTAL Z
GRN.-YEL.
E
FILAMENT Y
GRN.-YEL.
F
RED
G
ORG.
H
BLK.
J
BRN.-GRN.
K
BRN.-WHT.
L

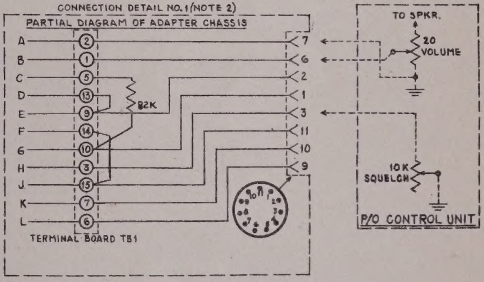
MODEL CHART

MODEL	APPLICATION	FILTER TYPE
TA140-R2	2 FREQ., 60 KC. CHANNEL SPACING	TU 145
TA140-X-R2	2 FREQ., 120 KC. CHANNEL SPACING	K-9242

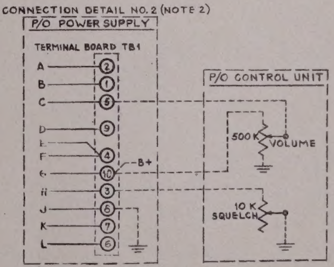
NOTES:

1. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, ± 10 %,
   1/2 WATT. K=1000 OHMS.
   CAPACITOR VALUES ARE IN MICROMICROFARADS.
2. POWER AND CONTROL LEADS A THRU L ARE WIRED TO THE TERMINAL BOARD OF EITHER THE ADAPTER CHASSIS OR POWER SUPPLY DEPENDING UPON THE SPECIFIC APPLICATION OF THE RECEIVER. REFER TO CONNECTION DETAIL NO.1 OR NO.2 FOR RESPECTIVE TERMINAL CONNECTIONS. (LETTERS A THRU L ARE FOR REFERENCE PURPOSES ONLY.)
3. HEATER TYPE CRYSTALS USED ON T43G & T53G SERIES MOBILE STATIONS ONLY.

CONNECTION DETAIL NO.1 (NOTE 2)


PARTIAL DIAGRAM OF ADAPTER CHASSIS
A
B
C
D
E
F
G
H
J
K
L
2
1
5
13
9
14
10
3
15
7
6
82K
7
6
2
1
3
11
10
9
TERMINAL BOARD TB1
TO SPKR.
20
VOLUME
10K
SQUELCH
P/O CONTROL UNIT

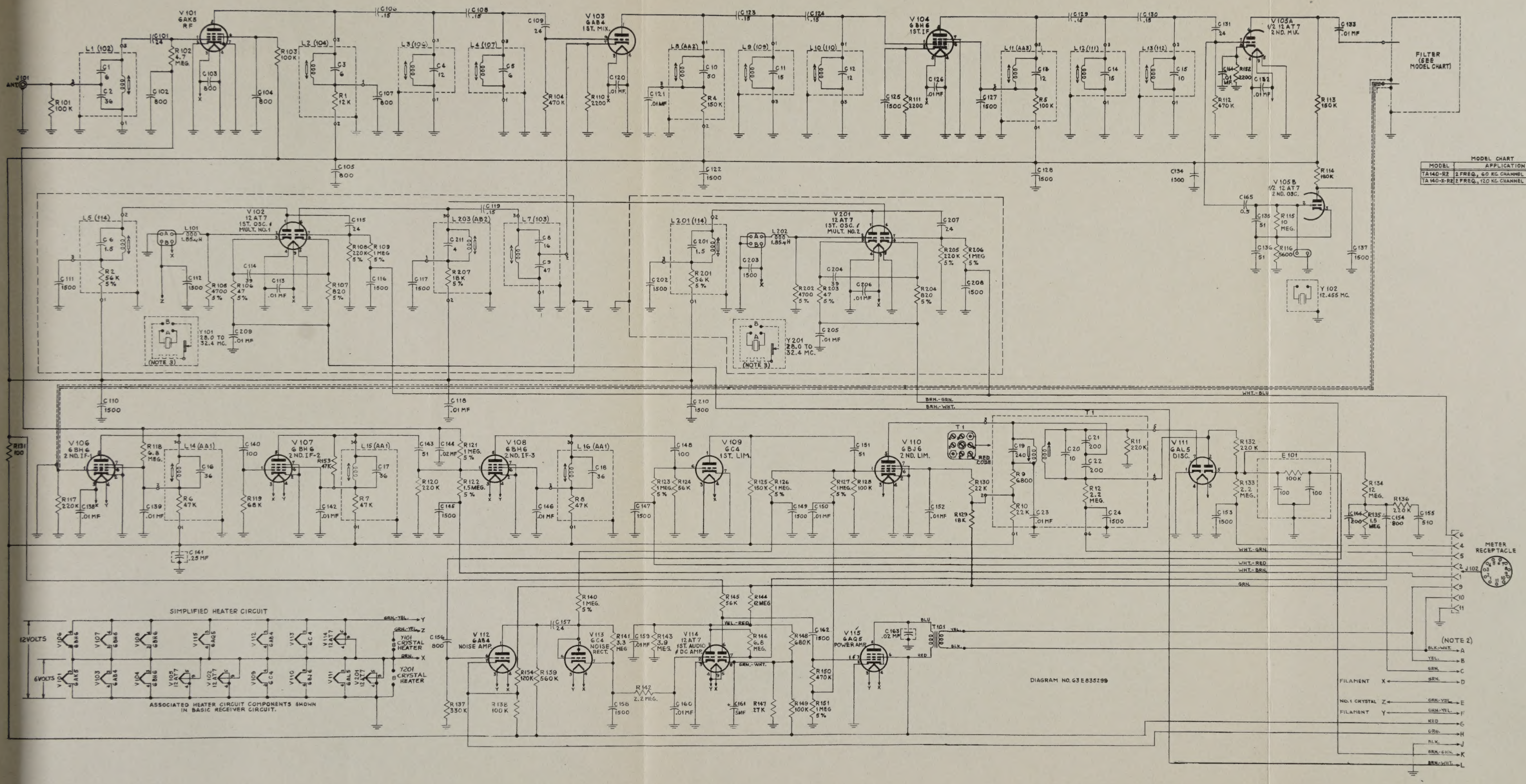
CONNECTION DETAIL NO. 2 (NOTE 2)


P/O POWER SUPPLY
TERMINAL BOARD TB1
A
B
C
D
E
F
G
H
J
K
L
2
1
5
9
4
10
3
8
7
6
B+
P/O CONTROL UNIT
500K
VOLUME
10 K
SQUELCH

PART NO. 63E835299
ISSUE - O 3/54-UM

MOTOROLA SCHEMATIC DIAGRAM
MODEL TA140 SERIES, 2-FREQ., 152-174 MC.
UNIVERSAL UNI-CHANNEL RECEIVER

TU188-R2 RECEIVER CHASSIS (BASIC)


J101 ANT.
V101 6AK5 RF
V103 6AB4 1ST. MIX.
V104 6BH6 1ST. I.F.
V105A 1/2 12AT7 2ND. MIX.
V105B 1/2 12AT7 2ND. OSC.
FILTER (SEE MODEL CHART)
V102 12AT7 1ST. OSC. & MULT. NO.1
V201 12AT7 1ST. OSC. & MULT. NO.2
Y101 28.0 TO 32.4 MC. (NOTE 3)
Y201 28.0 TO 32.4 MC. (NOTE 3)
Y102 12.455 MC.
V106 6BH6 2ND. I.F.-1
V107 6BH6 2ND. I.F.-2
V108 6BH6 2ND. I.F.-3
V109 6C4 1ST. LIM.
V110 6BJ6 2ND. LIM.
V111 6AL5 DISC.
T1
E101
METER RECEPTACLE
J102
SIMPLIFIED HEATER CIRCUIT
12VOLTS
6VOLTS
Y101 CRYSTAL HEATER
Y201 CRYSTAL HEATER
ASSOCIATED HEATER CIRCUIT COMPONENTS SHOWN IN BASIC RECEIVER CIRCUIT.
V112 6AB4 NOISE AMP.
V113 6C4 NOISE RECT.
V114 12AT7 1ST. AUDIO & DC AMP.
V115 6AQ5 POWER AMP.
T101
DIAGRAM NO. 63E835299
(NOTE 2)
BLK.-WHT. A
YEL. B
GRN. C
FILAMENT X BRN. D
NO.1 CRYSTAL Z GRN.-YEL. E
FILAMENT Y GRN.-YEL. F
RED G
ORG. H
BLK. J
BRN.-GRN. K
BRN.-WHT. L

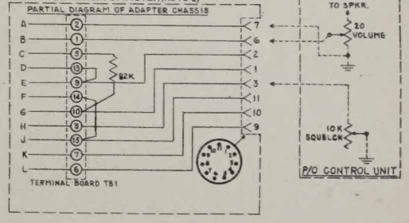
MODEL CHART

MODEL	APPLICATION	FILTER TYPE
TA140-R2	2 FREQ., 60 KC. CHANNEL SPACING	TU 145
TA 140-X-R2	2 FREQ., 120 KC. CHANNEL SPACING	K-9242

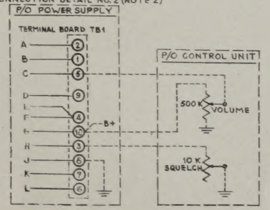
NOTES:

1. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, ± 10 %, 1/2 WATT. K = 1000 OHMS.
   CAPACITOR VALUES ARE IN MICROMICROFARADS.
2. POWER AND CONTROL LEADS A THRU L ARE WIRED TO THE TERMINAL BOARD OF EITHER THE ADAPTER CHASSIS OR POWER SUPPLY DEPENDING UPON THE SPECIFIC APPLICATION OF THE RECEIVER. REFER TO CONNECTION DETAIL NO.1 OR NO. 2 FOR RESPECTIVE TERMINAL CONNECTIONS. (LETTERS A THRU L ARE FOR REFERENCE PURPOSES ONLY.)
3. HEATER TYPE CRYSTALS USED ON T436 & T536 SERIES MOBILE STATIONS ONLY.

CONNECTION DETAIL NO.1 (NOTE 2)


PARTIAL DIAGRAM OF ADAPTER CHASSIS
A
B
C
D
E
F
G
H
J
K
L
82K
TERMINAL BOARD TB1
TO SPKR.
20 VOLUME
10 K SQUELCH
P/O CONTROL UNIT

CONNECTION DETAIL NO. 2 (NOTE 2)


P/O POWER SUPPLY
TERMINAL BOARD TB1
A
B
C
D
E
F
G
H
J
K
L
B+
P/O CONTROL UNIT
500 K VOLUME
10 K SQUELCH

PART NO. 63E835299
ISSUE - O 3/54-UM

UNIVERSAL TRANSMITTER CHASSIS
152-174 MC MOBILE STATION
10 WATTS RF OUTPUT

MODEL DESIGNATION	CHANNELS	CRYSTALS
TA139	1-FREQ.	(1) ASL1
TA139-C2	2-FREQ.	(2) ASL1

1. DESCRIPTION

a. Design

The MOTOROLA Model TA139 Universal Transmitter is a 152-174 mc. FM radio transmitter expressly designed for Two-Way Mobile radio applications. The unit incorporates 9 tubes and 11 tuned circuits exclusive of the primary oscillator coil. Basic transmitter circuitry includes a crystal controlled oscillator, a single angular phase modulator controlled by the MOTOROLA INSTANTANEOUS DEVIATION CONTROL circuit, four stages of frequency multiplication; a final power amplifier and a "Pi" section harmonic filter.

The MOTOROLA I.D.C. circuit is an integral part of the transmitter. This circuit limits modulation deviation to 100%. An adjustable control permits deviation regulation to any value dictated by channel width requirements.

All of the transmitter operating voltages are supplied by a separate power supply chassis. RF power output is dependant upon the bias and plate voltages applied to the doubler-driver and power amplifier stages of the transmitter. In application with the mobile power supplies described in this instruction manual, transmitter RF power output is a nominal 10 watts.

b. Applications

MOTOROLA Model TA139 Series Transmitters may be used with radio equipment operated from either a 6 VDC or 12 VDC primary power source without internal circuit modification. Universal design permits application

NOMINAL PERFORMANCE SPECIFICATIONS

BASIC UNIT	TA139 Series
FREQUENCY	152-174 Mc.
CRYSTAL MULTIPLICATION	Twenty-four (24) times
NOMINAL RF POWER OUTPUT	152-174 mc.: 10 watts
POWER SOURCE	Separate Vibrator Power Supply operating from 6.3 VDC or 12 VDC battery source.
SPURIOUS AND HARMONIC EMISSION	All spurious and harmonic emissions are attenuated at least 60 db. below carrier level.
FREQUENCY STABILITY AND TEMPERATURE RANGE	Using crystal control, the carrier is maintained to within ±.0025% of assigned center frequency from -30°C. to +60°C. ambient (+25°C. reference).
MODULATION	40F3: ±15 kc. deviation for 100% at 1000 cycles
AUDIO INPUT LEVEL	Mil. Mic. or Equivalent .25 V in series with 50 ohm input for 100% at 1000 cps. (Approx. -17 db.) Handset: .18 V in series with 50 ohm input for 100% at 1000 cps. (Approx. -20 db.)
TUBE COMPLEMENT AND FUNCTION	(1) 6AK6 - Oscillator (1-Freq.) or (2) 6AK6 - Oscillator (2-Freq.) (1) 12AT7 - Mod. Buffer-Doubler (1) 6AU6 - Tripler (1) 6AK6 - 2nd Doubler (1) 2E26 - Doubler Driver (1) 6146 - Power Amplifier (1) 6BH6 - I.D.C. Amplifier (1) 6AL5 - Clipper
NUMBER OF TUNED CIRCUITS	11 tuned circuits following the modulator including 4 double tuned multiplier stages, a multiple adjusted output circuit and a "Pi" section harmonic filter.

NOMINAL PERFORMANCE SPECIFICATIONS (Continued)

PLATE POWER SUPPLY		335 VDC at 120 ma. 270 VDC at 40 ma. 140 VDC at 15 ma. -17 VDC Bias	
PRIMARY INPUT DRAIN (TOTAL)	Input V.	6.3 VDC	12.6 VDC
	Standby	5.5 amps.	2.75 amps.
	Transmit	21 amps.	10.5 amps.
DIMENSIONS		2-3/8" wide x 5-1/4" high x 15" long	
WEIGHT		4-1/4 lbs.	

FCC LICENSE DESIGNATION: TA139
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

in front and rear mount mobile installations. Compact chassis size, 2-3/8" wide x 15" long, makes the transmitter most suitable for standard "10 inch" housing applications.

Two-frequency transmitters are identical to corresponding single-frequency versions with the exception that a second RF oscillator circuit is added. The two-frequency units may be operated with frequencies separated a maximum of ±300 kc. from circuit resonance without degradation of single-frequency nominal performance specifications. Two-frequency transmitters are normally phased at the factory on the higher of the two frequencies employed. In specific cases where channel separations exceed these limitations and where one channel is used much more frequently than the other, the transmitter may be aligned on the primary frequency (frequency most often used). When re-aligning the transmitter, it is recommended that this phasing procedure be observed to afford optimum performance.

2. CHASSIS COMPLEMENT

a. MOTOROLA Model TA139 is comprised of;

(1) TU187 Basic single-frequency transmitter chassis
Includes: (1) TK186 Coil Kit
Uses: (1) ASL1 Control Crystal

b. **MOTOROLA Model TA139-C2 is comprised of:**

(1) TU187-C2 Basic two-frequency transmitter chassis
Includes: (1) TK186-C2 Coil Kit
Uses: (2) ASL1 Control Crystals

3. PRE-ALIGNMENT NOTES

a. Factory Alignment

The transmitter was tuned and adjusted for its exact operating frequency prior to shipment from the factory. Unless it has been handled roughly while in transit or otherwise abused or tampered with, it should require no further adjustment, other than alignment of the final RF amplifier stage to the antenna, before placing it in service. If, for any reason, it becomes necessary for the transmitter to be retuned, the following alignment instructions outline the correct procedure.

Bear in mind, however, that meter readings will vary with change in battery voltage and will decrease with an increase in the life of the tubes and other components of the transmitter. Each time a transmitter is aligned or tested, the readings should be entered in a logbook.

IMPORTANT
It is illegal for anyone to tune or adjust a radio transmitter except under supervision of a radio operator holding a Radio Telephone license of applicable class.

b. Frequency Calculations

Transmitter crystal frequency and/or carrier frequency may be determined as follows:

f_c = carrier frequency

f_o = crystal frequency

$$f_o = \frac{f_c}{24} \qquad f_c = 24f_o$$

Example: $f_c = 153.60$ mc.

$$f_o = \frac{153.60}{24}$$

$f_o = 6.40$ mc. or 6400 kc.

c. Test Equipment

(1) One MOTOROLA P-8501-A Portable Test Set.

The MOTOROLA P-8501-A Test Set is designed and engineered for use with all MOTOROLA "RESEARCH" Line equipment. Simplified meter switching, an expanded meter range, and two crystal sockets have made the P-8501-A Test Set a universal instrument for the testing and alignment of MOTOROLA transmitters and receivers.

Read the instructions included with the test set carefully before attempting alignment.

(2) One Alignment Tool Kit (MOTOROLA K-9321).

(3) One RF wattmeter or dummy antenna. (Refer to Dummy Antenna Detail 69A474791).

(4) One power supply (preferably the power supply designed for the transmitter under test).

d. Preliminary "Set-Up" for Alignment

(1) Connect a dummy antenna or RF wattmeter, to the transmitter antenna receptacle.

(2) Connect the MOTOROLA portable test set to the metering receptacle on the transmitter chassis. (Refer to Parts Location Detail.)

(3) Portable test set switch positions for transmitter metering:

(a) Place GRID CURRENT-METER-FIELD STRENGTH switch in the METER position.

(b) Place the REC-XMTR-0 50 ua. switch in the XMTR position.

(4) Transmitter keying procedure:

When transmitter keying alone is required, the XMTR-ON switch of the portable test set may be used for this purpose. The XMTR-ON switch is connected in parallel with the push-to-talk terminals of the MIC receptacle but does not complete the microphone talk circuit. When it is required to modulate as well as to key the transmitter, connect a MOTOROLA P-255-A Microphone or equivalent into the MIC receptacle on the portable test set.

(5) Be sure the power supply is connected to the transmitter.

(6) Turn the equipment "on" to apply filament voltage to the transmitter and allow a 30 second warm-up period before applying high voltage (keying).

CAUTION

Although it is necessary to turn the transmitter plate voltage "on" to take meter readings and to make adjustments, never have the transmitter plate voltage turned "on" for more than a few seconds at a time until the transmitter is completely tuned. The plate current is high in untuned stages and may result in damage to tubes and parts if the transmitter is "on" for too long a period before the stages are completely aligned.

To make adjustments, turn the transmitter "on" by means of the push-to-talk button on the microphone or the XMTR-ON switch on the test set.

e. Two-Frequency Considerations

Two-frequency transmitters should normally be phased on the higher of the two frequencies employed. On completion of alignment, each frequency should be checked for proper output performance. In specific cases where channel separations exceed 300 kc. and the lower frequency is used much more frequently than the higher, it may be preferable to phase the unit on the lower frequency.

f. MOTOROLA Portable Test Set Switch Positions and Corresponding Circuits

SWITCH POSITION	CIRCUIT
1	No Connection
2	No Connection
3	Tripler Grid
-4	2nd Doubler Grid
+4 (PA)	Power Amplifier Plate Current
5	Doubler-Driver Grid

Chart Continued:

SWITCH POSITION	CIRCUIT
6	Power Amplifier Grid
7	Power Amplifier Plate Voltage
8	Push-to-Talk Circuit

4. ALIGNMENT INTRODUCTION

All adjustments for routine alignment of the transmitter are accessible from the top of the chassis. Coils T 1 and T 2, which have their primary slugs located on the bottom of the chassis are factory adjusted for optimum performance on the operating frequency of the transmitter and should normally require no further adjustment in the field. The primaries of these coils are sealed to prevent inadvertent detuning. For routine realignment of the transmitter, such as may be required when replacing tubes or other circuit components, follow the procedure outlined under ROUTINE MAINTENANCE ALIGNMENT in paragraph 5.

The more detailed comprehensive ALIGNMENT PROCEDURE described in paragraph 6 is expressly applicable for complete realignment of the transmitter such as may be required when changing transmitter frequency or replacing transformer coils T 1 or T 2. This procedure is most suitable for laboratory bench alignment.

5. ROUTINE MAINTENANCE ALIGNMENT

Before proceeding, prepare equipment as described in PRE-ALIGNMENT NOTES. When preparations are complete, follow the procedure as outlined below. Once proficiency is developed in alignment of the transmitter by the detailed method described in this text, future alignment may be performed by use of the Simplified Routine Maintenance Alignment Chart following this section.

a. Adjustment, Oscillator Coil L 1

Coil L 1 located adjacent to the crystal is the oscillator frequency adjustment coil and is preset at the factory. Under normal conditions, THE SETTING OF L 1 SHOULD NOT BE CHANGED IN THE FIELD. Should the setting of L 1 be accidently altered, or the crystal replaced, readjust the transmitter to the correct frequency by the method described in the comprehensive procedure of the following section (paragraph 6). If frequency adjustment is necessary on two-frequency models, adjust coils L 1 and L 201 as described in the comprehensive procedure.

b. Adjustment, 1st Doubler Transformer T 1

(1) Set the test set meter switch to position 3.

(2) Adjust the top slug of transformer T 1 for maximum meter reading.

c. Adjustment, Tripler Transformer T 2

(1) Set the meter switch to position -4.

(2) Adjust the top slug of transformer T 2 for maximum meter reading.

(3) Repeak T 1 for maximum on position -4.

d. Adjustment, 2nd Doubler Coils L 106, L 107

(1) Set the meter switch to position 5.

(2) Adjust Coil L 106 for maximum meter reading.

(3) Adjust Coil L 107 for maximum meter reading.

(4) Repeak T 2 for maximum on position 5.

e. Adjustment, Doubler Driver Plate Capacitor C 119 and PA Grid Capacitor C 121

(1) Set the meter switch to position 6.

(2) Adjust capacitor C 119 for maximum meter reading.

(3) Adjust capacitor C 121 for maximum meter reading.

(4) Repeak Coils L 106 and L 107 for maximum on position 6.

f. Adjustment, Power Amplifier

(1) Set the meter selector switch to PA (+4) position.

(2) Adjust ANT TRIMMER C125 for minimum coupling (capacitor plates fully meshed - screw slot parallel to length of chassis).

(3) Turn ANT COUPLING control fully clockwise to decouple wattmeter or dummy load.

(4) Adjust PA TUNING capacitor C 124 for a "dip" (minimum reading) on the test set meter.

g. Adjustments, Output Circuits

CAUTION

When making the following adjustments do not exceed 150 ma. plate current (30 ua. on test set).

(1) Adjust ANT TRIMMER C 125 clockwise (unmesh plates) until a maximum reading is obtained on test set.

(2) Disconnect wattmeter or dummy load and connect antenna.

(3) Couple transmitter to antenna by one of the following methods:

(a) Coupling to antenna using field strength meter.

When a field strength meter or the P-8501-A Test Set (as a field strength meter) is used, the transmitter must be inside the housing to avoid stray radiation. Allow only an opening sufficient to permit tuning of the ANT COUPLING and ANT TRIMMER controls. The antenna must be connected to the transmitter and stray radiations from approximate sources should be avoided. Adjust ANT TRIMMER C 125 and the ANT COUPLING control for a maximum indication on the field strength meter.

(b) Coupling to antenna without auxiliary meter.

With antenna connected, increase COUPLING gradually (rotating control counterclockwise) while alternately retuning PA tuning control C 124 for resonance (dip). Increase coupling until only a slight dip is apparent. Recheck adjustment for 95 ma. plate current.

h. Final Adjustments

(1) Repeak T 1, T 2, L 106, L 107, C 119 and C 121 as outlined in the preceding steps.

(2) Check meter readings. Refer to METER READINGS, paragraph 7 of this section.

6. COMPREHENSIVE ALIGNMENT PROCEDURE

a. Adjustment, Oscillator Coil L 1

Coil L 1, located on the transmitter chassis adjacent to the crystal, is the oscillator frequency adjustment. This coil is preset for the assigned frequency at the factory.

THE SETTING OF L 1 SHOULD NOT BE CHANGED IN THE FIELD. Should L 1 be accidently changed or if the crystal is replaced, it will be necessary to adjust the transmitter to the correct frequency. This should be done with a primary or secondary frequency standard only. A MOTOROLA F4MU-24B Serie Frequency Monitor may be used for this purpose. To adjust L 1 it is necessary to remove the guard plate covering the slug openings. After adjustment is completed, be sure to replace guard plate.

When it is necessary to adjust operating frequencies for two-frequency transmitters, first set the No. 1 oscillator "on-frequency" by adjusting coil L 1 and then set the No. 2 oscillator to its correct frequency by adjusting L 201. Check the first oscillator and reset the adjustment if necessary; then check and reset the second oscillator if necessary. After completing the adjustment, be sure to replace the guard plate over the coils.

b. Adjustment, 1st Doubler Transformer T 1

(1) Set the meter switch on the test set to position 3.

(2) Adjust the primary slug from the bottom of the transformer for maximum meter reading.

(3) Adjust the secondary slug from the top of the transformer for maximum meter reading. This circuit is tuned to two times crystal frequency.

c. Adjustment, Tripler Transformer, T 2

(1) Set the meter switch on the test set to position -4.

(2) Adjust the primary slug from the bottom of the transformer for maximum meter reading.

(3) Adjust the secondary slug from the top of the transformer for maximum meter reading. This circuit is tuned to six times crystal frequency.

(4) Repeak T 1 for maximum meter reading with the meter switch in position -4.

d. Adjustment, 2nd Doubler Coils L 106, L 107

(1) Set the meter switch on the test set to position 5.

(2) Adjust Coil L 106 for maximum meter reading.

(3) Adjust Coil L 107 for maximum meter reading. This circuit is tuned to twelve times crystal frequency.

(4) Repeak T 2 for maximum meter reading with the meter switch in position 5.

e. Adjustment, Doubler Driver Plate Capacitor C 119 and PA Grid Capacitor C 121

(1) Set the meter switch on the test set to position 6.

(2) Adjust capacitor C 119 for maximum meter reading.

(3) Adjust capacitor C 121 for maximum meter reading. This circuit is tuned to twenty-four times crystal frequency.

NOTE

A fixed reading in position 6 does not indicate proper alignment of C 119 and C 121. The fixed bias supplied by the power supply will always provide a meter reading in position 6. Proper alignment of C 119 and C 121 will be indicated by a definite tuning peak on the meter.

(4) Repeak coils L 106 and L 107 for maximum meter reading in position 6.

f. Adjustment, Power Amplifier

(1) Set the meter selector switch to the PA (+4) position.

(2) With the 66A891487 alignment tool adjust ANT TRIMMER capacitor C 125 for minimum coupling (maximum capacity) with capacitor plates fully meshed (screw slot parallel to length of chassis).

(3) Turn output ANT COUPLING adjustment fully clockwise to decouple the dummy load or wattmeter.

(4) Adjust PA TUNING capacitor C 124 for a "dip" (minimum reading) on the test set meter.

g. Adjustment, Output Circuits

(1) Adjust the PA plate circuit to the RF LOAD by turning the ANT TRIMMER capacitor C 125 clockwise (decrease capacity) until a maximum reading has been obtained on the test set meter.

(2) Couple the RF plate circuit to the RF LOAD.

CAUTION

When making the following adjustments, do not exceed 150 milliamperes plate current (30 ua on test set).

(a) Coupling to Antenna Without Auxiliary Meter

1. Connect the antenna to be used in normal operation of the station to the antenna connector on the transmitter chassis.

2. Turn the ANT COUPLING adjustment counterclockwise to increase the coupling and tune the PA TUNING capacitor C 124 through resonance--resonance is indicated by a "dip" in the meter reading.

3. Gradually increase the coupling to a point where only a slight "dip" is noticeable when tuning through resonance. This will indicate the point of maximum output. DO NOT exceed 150 milliamperes plate current.

NOTE

Care should be taken not to overcouple the transmitter to the antenna as the plate current "dip" will disappear and actual power output will be below the maximum value. Also, a false dip may occur which will not be coincident with maximum radiation.

To ascertain the exact point for maximum power output and best efficiency, a field strength meter or RF wattmeter should be used as described in the following paragraphs.

(b) Coupling to Antenna Using Field Strength Meter

CAUTION

A field strength meter may only be used if proper precautions are observed to insure that the meter receives a signal from the transmitter antenna and that no spurious radiations from any other radio equipment are present.

1. Connect the antenna to be used in normal operation of the station to the antenna connector on the transmitter chassis.

2. Place the RF probe from the field strength meter or the P-8501-A Test Set (used as a field strength meter) within a few feet of the transmitter antenna.

3. Place the transmitter as far as possible into the associated equipment housing to avoid stray radiations. Allow only an opening sufficient to permit tuning of the ANT COUPLING and ANT TRIMMER controls.

4. Actuate the transmitter and adjust the ANT TRIMMER capacitor C 125 and the ANT COUPLING control for a maximum indication on the field strength meter.

5. If the meter should read off scale; reduce the signal pick-up by folding the RF probe or by moving it further away from the transmitter antenna. This procedure will permit the transmitter to be adjusted for maximum radiated signal.

(c) Coupling to RF Wattmeter for Laboratory Bench Testing

1. Couple the PA plate circuit for desired RF output by turning the ANT COUPLING adjustment counterclockwise until the transmitter is loaded to the desired RF power output as indicated on the RF wattmeter.

NOTE

FCC regulations state: The power which may be used by a station shall be no more than the minimum required for satisfactory technical operation commensurate with the size of the area to be served and local conditions which affect radio transmission and reception.

Example: Federal Register, Volume 14, Number 87, Page 23, Paragraph 10.106.

2. Readjust the ANT TRIMMER capacitor C 125 for a maximum reading on the RF wattmeter.

(d) Coupling to Dummy Antenna Load Lamp for Laboratory Bench Testing

1. Turn the ANT COUPLING adjustment counterclockwise until a maximum brightness has been obtained.

2. Readjust the ANT TRIMMER capacitor C 125 for a maximum reading on the alignment meter.

(3) Check input power to final amplifier

Power input to the final amplifier should not exceed 50 watts. This input power is computed as the product of PA plate current and the voltage applied to the PA plate circuit. PA voltage may be measured at contact #10 of the transmitter input terminal board (located on power supply chassis). If the supply voltage is such that the final amplifier power input is not in agreement with the maximum allowable specification, PA loading may be varied to produce the desired power input. However, in no case should the plate current exceed 150 ma.

NOTE

Due to variations in the characteristics of the 6146 tube, the maximum power output will occur at different values of plate current for different tubes. The final amplifier plate current for rated power output from the tube shipped in the unit is included on the final test data sheet shipped with the equipment.

h. Final Adjustments

(1) With the transmitter turned "on", repeak T 1, T 2, L 106, L 107, C 119 and C 121 as outlined in the preceding discussions.

(2) Check meter readings. Refer to the following paragraph for proper readings after final adjustments.

7. METER READINGS AFTER FINAL ADJUSTMENTS

The values listed in the following table are relative and will vary with each unit. However, the readings provide a good indication of proper operation when compared with normal values previously recorded or supplied by the factory. The readings specified are obtained with a MOTOROLA P-8501- A Test Set.

TA139 Series Transmitters (10 watts)

SWITCH POSITION	1	2	3	-4	5	6	7	8	PA (+4)
METER SCALE READING	-	-	13	8	16	11	17	*	‡30

METER READING NOTES:

a. All readings except the PA are MINIMUM readings required for proper operation of the transmitter. The PA reading is the MAXIMUM value of plate current to which the unit may be safely tuned. DO NOT exceed this reading.

b. Readings #1 thru #6 are purely relative and will not constitute the actual current or voltage conditions of the circuits being measured.

c. Position 7 provides an indication of transmitter B+ voltage. In this application, the P-8501-A Test Set becomes a voltmeter with a full scale deflection of 1000 volts. For a voltage reading, multiply the ua scale reading by 20 and calibrate in volts. Example: Scale reading of 17 ua equals a true reading of 340 volts.

*d. Position 8 reads, DC relay control voltage when transmitter is not being keyed and zero (0) when the transmitter is being keyed. To obtain actual voltage, multiply the meter reading of the P-8501-A Test Set by 0.3 and calibrate in volts.

‡e. To obtain actual PA plate current, multiply the meter reading of the P-8501-A Test Set by 5 and calibrate in milliamperes. Example: Scale reading of 30 ua equals a true current reading of 150 ma.

8. AUDIO ADJUSTMENTS AND CONNECTIONS

a. I. D. C. "Instantaneous Deviation Control"

The adjustable I. D. C. circuit has been set for proper operation at the factory. No attempt should be made to change this adjustment control unless a MOTOROLA F4MU-24B Series Station Monitor or equivalent is available to check modulation deviation.

In the event that readjustment of the I. D. C. circuit becomes necessary, the subsequent procedure should be followed:

(1) Set up a MOTOROLA F4MU-24B Series Station Monitor for VOICE MODULATION MEASUREMENT. Refer to the station monitor instruction manual for measurement instructions.

(2) Turn the monitored transmitter "on" and modulate with a 1000 cycle tone or a loud sustained oral sound (use the word Ahhh---).

(3) Adjust the I. D. C. control (R 130) on the top of the transmitter chassis for proper modulation deviation. For 60 kc. or 120 kc. channel spacing applications, the I. D. C. control should be adjusted for an approximate 13 kc. reading on the station monitor MODULATION DEVIATION METER. Note that the MODULATION DEVIATION METER will swing up to 15 kc. on voice peaks.

NOTE

FCC rules and regulations stipulate a maximum allowable modulation deviation of ±15 kc. for standard channel applications.

b. Audio Sensitivity Connections

All transmitters described herein have a two level connection to the I.D.C. amplifier for modifying the basic audio sensitivity of the unit. Audio sensitivity variations are achieved by connecting the input grid capacitor (C 123) lead to either of two points as shown on Schematic Diagram 63E835284. When a MOTOROLA military type microphone or equivalent is to be used with the transmitter, connect the grid capacitor lead to "POSITION 1" (0.25 volt sensitivity). For use with a handset, connect the grid capacitor lead to "POSITION 2" (0.18 volt sensitivity).

9. SCHEMATIC DIAGRAM PARTS LIST

MODELS: TA139 TRANSMITTER UNIT (152-174 Mc.) 1-Freq.
TA139-C2 TRANSMITTER UNIT (152-174 Mc.) 2-Freq.

REFERENCE:
Schematic Diagram
63E835284

a. TU187 Transmitter Chassis (Basic) 1-Freq. p/o TA139

Ref. Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 101	21R474330	Fixed: ceramic, tubular; 20 mmf ±5%; 500 vdcw
C 102	21R83198	Fixed: ceramic; tubular; 51 mmf ±5%; 500 vdcw
C 103	21K6638	Fixed: molded sliver mica; 1000 mmf ±20%; 300 vdcw
C 104	21K2733	Fixed: molded silver mica; 30 mmf ±10%; 500 vdcw
C 105	21K2753	Fixed: molded silver mica; 3.3 mmf ±.5 mmf; 500 vdcw
C 106	21B800801	Fixed: ceramic; disc, 1500 mmf GMV +100% max.; 500 vdcw
C 107	23K892117	Fixed: electrolytic; tubular; 3 section; consisting of:
C 107A		20 mf +50-10%; 450 vdcw; section
C 107B		△10 mf +50-10%; 450 vdcw; section
C 107C		□10 mf +100-10%; 25 vdcw; section
C 108	21K474009	Fixed: ceramic; tubular; 100 mmf ±20%; 500 vdcw
C 109		Same as C 106
C 110	21A801139	Fixed: ceramic; disc; .01 mf +80-20%; 600 vdcw
C 111		Same as C 110
C 112		Same as C 106
C 113		Same as C 106
C 114	21A112247	Fixed: silver mica; 250 mmf ±10%
C 115	21A824948	Fixed: silver mica; 500 mmf +20-10%; 600 vdcw
C 116		Same as C 110
C 117		Same as C 106
C 118		Same as C 110
C 119		P/o TK186 Transmitter Coil Kit Section
C 120	21K835358	Fixed: silver mica; 15 mmf ±10%
C 121	19A475605	Variable: air; 2.15 mmf min. - 14.58 mmf max.
C 122		Same as C 115
C 123		Same as C 110
C 124	19A475604	Variable: air; 7 mmf min. - 42.8 mmf max.
C 125	19K800032	Variable: air; 2.6 mmf min. - 19.7 mmf max.
C 126	23K890624	Fixed: electrolytic; tubular; 1 section; 5 mf +100-15%; 150 vdcw
C 127		Same as C 110

SCHEMATIC DIAGRAM PARTS LIST (Continued)

Ref. Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 128	21R401029	Fixed: ceramic; disc; .02 mf +80-20%; 500 vdcw
C 129		Same as C 110
C 130	8K823109	Fixed: oil filled; tubular; .003 mf ±10%; 100 vdcw
C 131	21R2709	Fixed: molded silver mica; 200 mmf ±5%; 500 vdcw
		CONNECTORS,
J 101	9A87120	Receptacle: female; single contact; round molded mica filled base; chassis mounted
J 102		Same as J 101
J 103	9B880881	Receptacle: female; 11 contact; polarized; round molded black phenolic base; saddle mounting
		RELAY,
K 101	59B800031	Armature: 6 VDC; contact arrangement, 1 form "C"
		COILS, RF:
L 101	24A835157	Choke: 242 microhenries; coded BRN dot; Neutralizing
L 102	24A832402	Choke: 100 microhenries; coded BLUE dot; Oscillator
L 103		Same as L 102 except Modulator
L 104	24A891063	Choke: 1.3 microhenries; coded BLUE dot
L 105	1V835385	Antenna Pick-up Loop
L 106		P/o TK186 Transmitter Coil Kit Section
L 107		P/o TK186 Transmitter Coil Kit Section
		RESISTORS,
R 101	6R6038	Fixed: carbon; 1500 ohm ±10%; 1/2 w; ins.
R 102	6R6031	Fixed: carbon; 100, 000 ohm ±10%; 1/2 w; ins.
R 103	6R6320	Fixed: carbon; 10, 000 ohm ±10%; 1/2 w; ins.
R 104	6R6394	Fixed: carbon; 12, 000 ohm ±10%; 1/2 w; ins.
R 105	6R6048	Fixed: carbon; 47, 000 ohm ±10%; 1/2 w; ins.
R 106	6R6411	Fixed: carbon; 1000 ohm ±5%; 1/2 w; ins.
R 107	6R6229	Fixed: carbon; 1000 ohm ±10%; 1/2 w; ins.
R 108		Same as R 102
R 109	6R6414	Fixed: carbon; 270 ohm ±10%; 1/2 w; ins.
R 110		Same as R 102
R 111		Same as R 105
R 112	6R401017	Fixed: carbon; 1.8 megohm ±5%; 1/2 w; ins.
R 113	6R6434	Fixed: carbon; 27, 000 ohm ±10%; 1/2 w; ins.
R 114	6R6341	Fixed: carbon; 22, 000 ohm ±10%; 1 w; ins.
R 115	6R2004	Fixed: carbon; 8, 200 ohm ±10%; 1/2 w; ins.
R 116	6R2073	Fixed: carbon; 2.2 megohm ±5%; 1/2 w; ins.
R 117	6R120638	Fixed: carbon; 330 ohm ±5%; 1/2 w; ins.

SCHEMATIC DIAGRAM PARTS LIST (Continued)

Ref Symbol	Motorola Pt. No.	Description
		RESISTORS,
R 118	6R5645	Fixed: carbon; 150 ohm ±5%; 1/2 w; ins.
R 119	6R6407	Fixed: carbon; 220,000 ohm ±10%; 1/2 w; ins.
R 120	6R2068	Fixed: carbon; 33,000 ohm ±5%; 1/2 w; ins.
R 121	6R6269	Fixed: carbon; 820 ohm ±10%; 1/2 w; ins.
R 122	6R6080	Fixed: carbon; 4700 ohm ±10%; 1/2 w; ins.
R 123	6R2061	Fixed: carbon; 180,000 ohm ±5%; 1/2 w; ins.
R 124	6R6475	Fixed: carbon; 680,000 ohm ±10%; 1/2 w; ins.
R 125	6R5773	Fixed: carbon; 820,000 ohm ±5%; 1/2 w; ins.
R 126		Same as R 124
R 127		Same as R 102
R 128	6R6299	Fixed: carbon; 10,000 ohm ±10%; 2 w; ins.
R 129		Same as R 128
R 130	18K812998	Variable: carbon; 300,000 ohm ±20%; 1/4 w.
R 131	17K892469	Fixed: wire wound; 4 ohm ±2%; 1 w; ins.
	or 17B821901	Fixed: wire wound; 4 ohm ±2%; 3 w; ins.
		TUBES,
V 101	6AK6	Electron
V 102	12AT7	Electron
V 103	6AU6	Electron
V 104		Same as V 101
V 105	2E26	Electron
V 106	6146	Electron
V 107	6BH6	Electron
V 108	6AL5	Electron
		SOCKETS,
XV 101	9K87124	Tube: female; 7 contact; miniature; molded mica filled phenolic base; includes center shield; saddle mounting
XV 102	9B821448	Tube: female; 9 contact; miniature; molded mica filled phenolic base; includes center shield and tube shield base; saddle mounting
XV 103		Same as XV 101
XV 104		Same as XV 101
XV 105	9B890001	Tube: female; 8 contact; brown bakelite wafer base; saddle mounting
XV 106		Same as XV 105
XV 107	9B834083	Tube: female; 7 contact; miniature; molded mica filled phenolic base; includes center shield and tube shield base; saddle mounting
XV 108		Same as XV 107

Ref. Symbol	Motorola Pt. No.	Description
		SOCKET,
XY 101	9A30451	Crystal: female; 4 contact; square molded mica filled bakelite base; chassis mounted

b. TK186 Transmitter Coil Kit (152-174 Mc.) P/O TU187

Ref. Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 1	21R114368	Fixed: ceramic; tubular; 30 mmf ±5%; 500 vdcw; p/o L 1
C 2	21R38932	Fixed: ceramic; tubular; 24 mmf ±5%; 500 vdcw; p/o L 1
C 3	21K6638	Fixed: molded mica; 1000 mmf ±20%; 500 vdcw; p/o T 1
C 4		Same as C 3 except p/o T 1
C 5		Same as C 3 except p/o T 2
C 6		Same as C 3 except p/o T 2
C 7	21A881306	Fixed: ceramic; tubular; stud mounting type; 500 mmf ±10%; 500 vdcw
C 8	21R890046	Fixed: ceramic; tubular; 18 mmf ±5%; 500 vdcw
C 9		Same as C 8
C 10	21K474952	Fixed: ceramic; tubular; 4 mmf ±0.5 mmf; 500 vdcw; p/o T 1
C 11	21K87130	Fixed: ceramic; tubular; 5 mmf ±0.5 mmf; 500 vdcw; p/o T 1
C 119	19K800032	Variable: air; 2.6 mmf min. - 19.7 mmf max.; p/o L 2
		COILS, RF:
L 1	24B835381	Oscillator Warping: base stamped AA4; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot
L 2	1V835418	Driver RF Plate
L 3	24A891063	Choke; 1.3 microhenries; p/o L 2
L 4	1V835420	Final RF Grid
L 5	1V835421	Final RF Plate
L 6		Same as L 3 except p/o L 5
L 7	24A801714	Filter; 0.1 microhenries

Ref. Symbol	Motorola Pt. No.	Description
		COILS, RF:
L 106	24B835395	2nd Doubler Plate; base stamped AA7; includes 1V835422 CORE, adjustable tuning; and clip; coded BLUE dot
L 107	24K835396	2nd Doubler Grid; base stamped AA8; includes 1V835422 CORE, adjustable tuning; and clip; coded BLUE dot
		RESISTORS,
R 1	6R5577	Fixed: carbon; 2700 ohm ±10%; 1/2 w; ins; p/o T 1
R 2	6R6031	Fixed: carbon; 100, 000 ohm ±10%; 1/2 w; ins. p/o T 1
R 3	6R2028	Fixed: carbon; 2200 ohm ±5%; 1/2 w; ins; p/o T 1
R 4		Same as R 1 except p/o T 2
R 5		Same as R 2 except p/o T 2
R 6	6R6411	Fixed: carbon; 1000 ohm ±5%; 1/2 w; ins; p/o T 2
		TRANSFORMERS, RF:
T 1	24B835397	1st Doubler; base stamped AA5; includes: 1V87207 CORE, adjustable tuning; and palnut 1V87208 CORE, adjustable tuning; and clip
T 2	24K835417	Tripler; base stamped AA6; includes: 1V87207 CORE, adjustable tuning; and palnut 1V87208 CORE, adjustable tuning; and clip

c. TU187-C2 Transmitter Chassis (Basic) 2-Freq.; p/o TA139-C2

NOTE

The Schematic Diagram Parts List for the TU187-C2 Basic Chassis (2-Freq.) is the same as the Schematic Diagram Parts List for the TU187 Basic Chassis (1-Freq.) except for the addition of the following 200 series referenced components.

Ref. Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 203	21R474330	Fixed: ceramic; tubular; 20 mmf ±5%; 500 vdcw
C 204	21R83198	Fixed: ceramic; tubular; 51 mmf ±5%; 500 vdcw
C 205	21B800801	Fixed: ceramic; disc; 1500 mmf GMV +100% max.; 500 vdcw
C 206		Same as C 205

Ref. Symbol	Motorola Pt. No.	Description
		COILS, RF:
L 202	24A835157	Choke; 242 microhenries; coded BRN dot; Neutralizing
L 203	24A832402	Choke; 100 microhenries; coded BLUE dot; Oscillator
		RESISTORS,
R 201	6R6031	Fixed: carbon; 100,000 ohm ±10%; 1/2 w; ins.
R 202	6R6038	Fixed: carbon; 1500 ohm ±10%; 1/2 w; ins.
		TUBE,
V 201	6AK6	Electron
		SOCKET,
XV 201	9K87124	Tube: female; 7 contact; miniature; molded mica filled phenolic base; includes center shield; saddle mounting
		SOCKET,
XY 201	9A30451	Crystal: female; 4 contact; square molded mica filled bakelite base; chassis mounted

d. TK186-C2 Transmitter Coil Kit (152-174 mc.) 2-Freq.; p/o TU187-C2

NOTE

The Schematic Diagram Parts List for the TK186-C2 Coil Kit (2-Freq.) is the same as the Schematic Diagram Parts List of the TK186 Coil Kit (1-Freq.) except for the addition of the following 200 series referenced components.

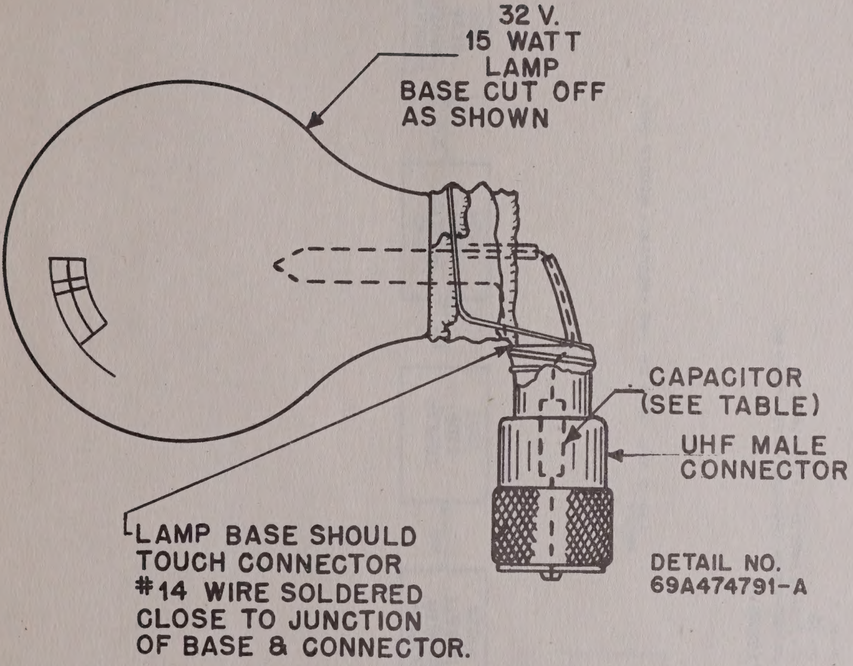
Ref. Symbol	Motorola Pt. No.	Description
		CAPACITORS,
C 201	21R114368	Fixed: ceramic; tubular; 30 mmf ±5%; 500 vdcw; p/o L 201
C 202	21R38932	Fixed: ceramic; tubular; 24 mmf ±5%; 500 vdcw; p/o L 201
		COIL, RF:
L 201	24B835381	Oscillator Warping; base stamped AA4; includes 46K881276 CORE, adjustable tuning; coded ORANGE dot

e. Crystals

NOTE

CRYSTAL UNITS are not part of the Transmitter Unit, but are part of overall model, and must be ordered separately.

Ref. Symbol	Motorola Pt. No.	Description
		CRYSTAL UNITS,
Y 101	1U835987	Quartz: Trans. Osc. 1250 - 16000 kc. MOTOROLA Type ASL; when ordering frequency must be specified.
Y 201		Same as Y 101 except used only for two-frequency operation

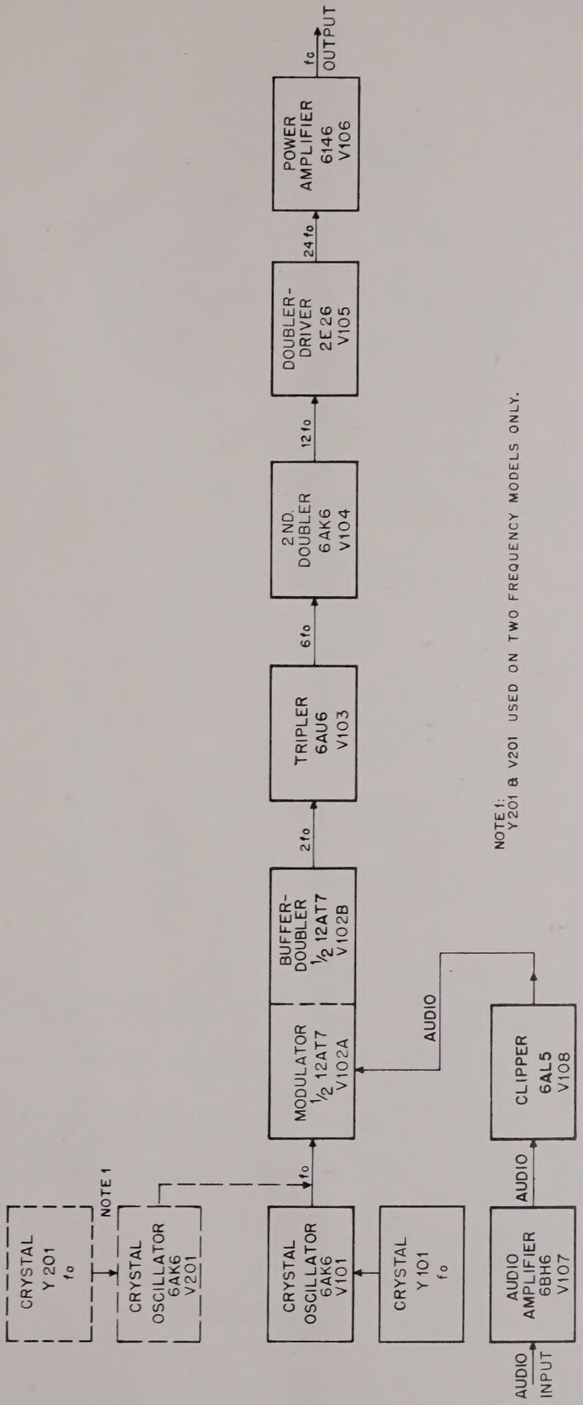

32 V.
15 WATT
LAMP
BASE CUT OFF
AS SHOWN
CAPACITOR
(SEE TABLE)
UHF MALE
CONNECTOR
LAMP BASE SHOULD
TOUCH CONNECTOR
#14 WIRE SOLDERED
CLOSE TO JUNCTION
OF BASE & CONNECTOR.

DETAIL NO.
69A474791-A

CAPACITOR TABLE

FREQUENCY RANGE	VALUE REQUIRED
25-50 MC.	40 MMF.
152-174 MC.	3 MMF.

MOTOROLA BLOCK DIAGRAM
MODEL TA139 SERIES, 152-174 MC.
UNIVERSAL 25 WATT TRANSMITTERS


CRYSTAL
Y 201
fo
NOTE 1
CRYSTAL
OSCILLATOR
6AK6
V201
CRYSTAL
OSCILLATOR
6AK6
V101
CRYSTAL
Y101
fo
AUDIO
INPUT
AUDIO
AMPLIFIER
6BH6
V107
AUDIO
CLIPPER
6AL5
V108
AUDIO
fo
MODULATOR
½ 12AT7
V102A
BUFFER-
DOUBLER
½ 12AT7
V102B
2fo
TRIPLER
6AU6
V103
6fo
2ND.
DOUBLER
6AK6
V104
12fo
DOUBLER-
DRIVER
2E26
V105
24fo
POWER
AMPLIFIER
6146
V106
fc
OUTPUT

NOTE 1:
Y201 & V201 USED ON TWO FREQUENCY MODELS ONLY.

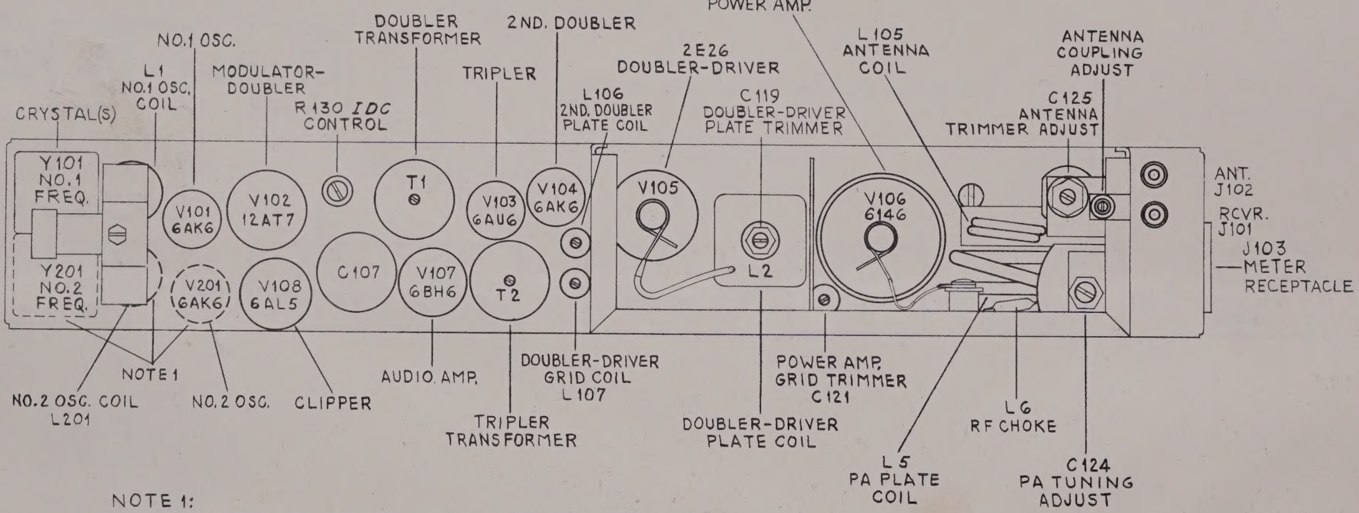
LEGEND—

fo = OSCILLATOR FREQUENCY = 6.333 - 7.250 MC.
fc = CARRIER FREQUENCY = 152-174 MC.
$f_o = \frac{f_c}{24}$
$f_c = 24 f_o$

PART NO. 63C835281
ISSUE - O 3/54-RS

MOTOROLA PARTS LOCATION DETAIL
MODEL TA139 SERIES, 152-174 MC.
UNIVERSAL 25 WATT TRANSMITTER

TOP VIEW OF CHASSIS


CRYSTAL(S)
Y101 NO.1 FREQ.
Y201 NO.2 FREQ.
L1 NO.1 OSC. COIL
NO.1 OSC.
MODULATOR-DOUBLER
R130 IDC CONTROL
DOUBLER TRANSFORMER
TRIPLER
2ND. DOUBLER
L106 2ND. DOUBLER PLATE COIL
2E26 DOUBLER-DRIVER
C119 DOUBLER-DRIVER PLATE TRIMMER
POWER AMP.
L105 ANTENNA COIL
C125 ANTENNA TRIMMER ADJUST
ANTENNA COUPLING ADJUST
ANT. J102
RCVR. J101
J103 METER RECEPTACLE
V101 6AK6
V102 12AT7
T1
V103 6AU6
V104 6AK6
V105
L2
V106 6146
V201 6AK6
V108 6AL5
C107
V107 6BH6
T2
NOTE 1
NO.2 OSC. COIL L201
NO.2 OSC.
CLIPPER
AUDIO. AMP.
TRIPLER TRANSFORMER
DOUBLER-DRIVER GRID COIL L107
DOUBLER-DRIVER PLATE COIL
POWER AMP. GRID TRIMMER C121
L5 PA PLATE COIL
L6 RF CHOKE
C124 PA TUNING ADJUST

NOTE 1:
Y201, L201 & V201 ARE USED WITH 2 FREQUENCY MODELS ONLY.

MOTOROLA VOLTAGE & RESISTANCE DIAGRAM
MODEL TA139 SERIES, 152-174 MC.
UNIVERSAL TRANSMITTER, 10 WATTS

MAY VARY
COMPONENT
ES TO BE
LY 6.3 VDC,

VOLTAGE CHART NOTES:

1. ALL READINGS TAKEN WITH RESPECT TO GROUND. VOLTAGE MEASUREMENTS TO BE MADE WITH A VACUUM TUBE VOLTMETER.
× 2. READINGS TAKEN WITH 1 MEG. RESISTOR IN SERIES WITH METER LEAD.
3. MICROPHONE IN CIRCUIT.
4. VOLTAGE READINGS FOR V101 AND V102 ARE TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION ON 2-FREQUENCY UNITS.
5. METERING TEST SET NOT CONNECTED.

CAP
∞
∞

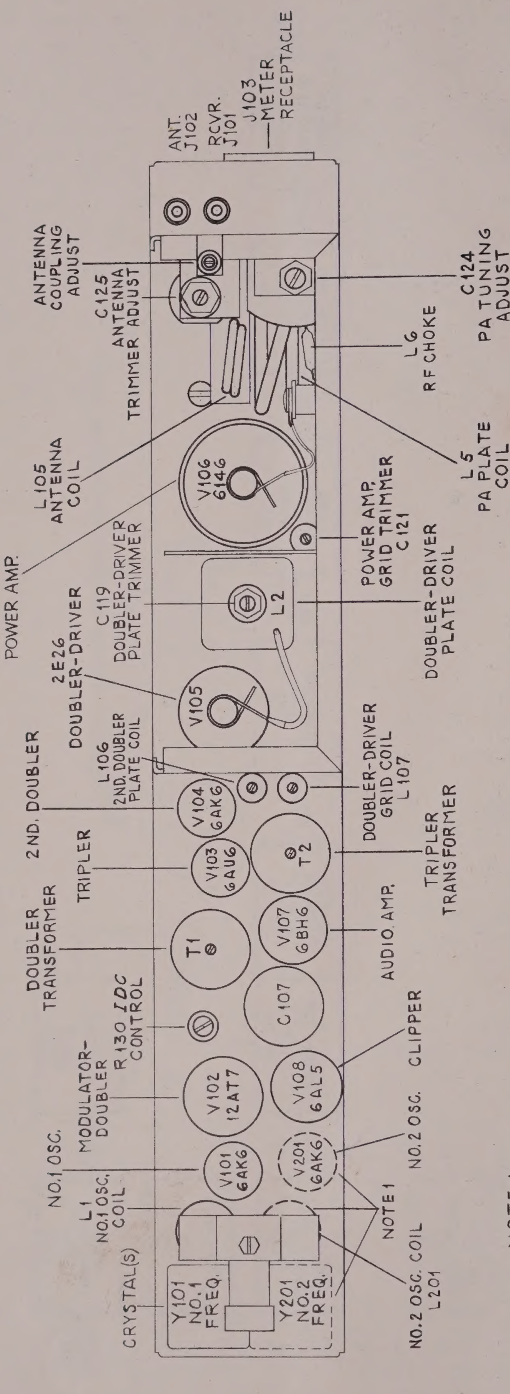
RESISTANCE CHART NOTES:

1. ALL READINGS TAKEN WITH RESPECT TO GROUND. MEASUREMENTS TO BE MADE WITH A VACUUM TUBE VOLTMETER.
2. TRANSMITTER UNIT CONNECTED TO POWER SUPPLY. ALL TUBES IN SOCKETS AND METERING TEST SET NOT CONNECTED.
3. NO FILAMENT VOLTAGE APPLIED TO UNIT.
4. NEGATIVE PROBE OF OHMMETER CONNECTED TO GROUND.
✱ 5. THIS READING WILL VARY WITH ADJUSTMENT OF R130.
‡ 6. READINGS FOR 1 AND 2 FREQUENCY OPERATION WITH FREQUENCY SWITCH IN APPLICABLE POSITION.
7. MICROPHONE NOT IN CIRCUIT.
• 8. AN INITIAL LOW READING MAY BE OBTAINED AT MANY POINTS DUE TO THE CHARGING OF CAPACITORS IN THE POWER SUPPLY. PERMIT CAPACITORS TO CHANGE TO OBTAIN FINAL READING.

PART NO. 63D836079
ISSUE - O 3/54-UM

MOTOROLA PARTS LOCATION DETAIL
MODEL TA139 SERIES, 152-174 MC.
UNIVERSAL 25 WATT TRANSMITTER

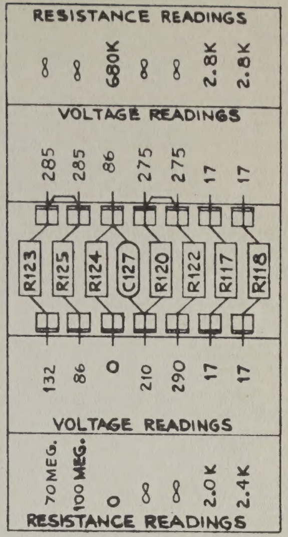
TOP VIEW OF CHASSIS


ANT. J102
RCVR. J101
J103 METER RECEPTACLE
ANTENNA COUPLING ADJUST
C125 ANTENNA TRIMMER ADJUST
C124 PA TUNING ADJUST
L6 RF CHOKE
L105 ANTENNA COIL
L5 PA PLATE COIL
POWER AMP.
V106 6146
POWER AMP. GRID TRIMMER C121
2E26 DOUBLER-DRIVER
C119 DOUBLER-DRIVER PLATE TRIMMER
L2
DOUBLER-DRIVER PLATE COIL
V105
2ND. DOUBLER
L106 2ND. DOUBLER PLATE COIL
V104 6AK6
DOUBLER-DRIVER GRID COIL L107
TRIPLER
V103 6AU6
T2
TRIPLER TRANSFORMER
DOUBLER TRANSFORMER
T1
V107 6BH6
AUDIO. AMP.
R130 IDC CONTROL
C107
MODULATOR-DOUBLER
V102 12AT7
V108 6AL5
CLIPPER
NO.1 OSC.
V101 6AK6
V201 6AK6
NO.2 OSC.
L1 NO.1 OSC. COIL
NOTE 1
CRYSTAL(S)
Y101 NO.1 FREQ.
Y201 NO.2 FREQ.
NO.2 OSC. COIL L201

NOTE 1:
Y201, L201 & V201 ARE USED WITH 2 FREQUENCY MODELS ONLY.

PART NO. 69C835282
ISSUE - O 3/54-RS

MOTOROLA VOLTAGE & RESISTANCE DIAGRAM
MODEL TA139 SERIES, 152-174 MC.
UNIVERSAL TRANSMITTER, 10 WATTS

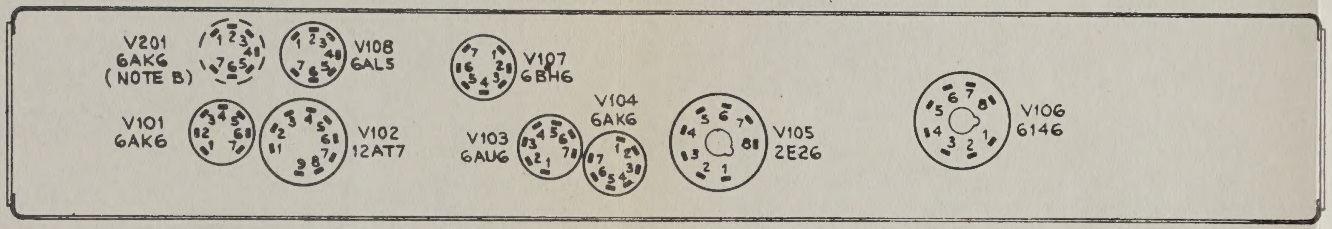

RESISTANCE READINGS
∞
∞
680K
∞
∞
2.8K
2.8K
VOLTAGE READINGS
285
285
86
275
275
17
17
R123
R125
R124
C127
R120
R122
R117
R118
132
86
0
210
290
17
17
VOLTAGE READINGS
70 MEG.
100 MEG.
0
∞
∞
2.0K
2.4K
RESISTANCE READINGS

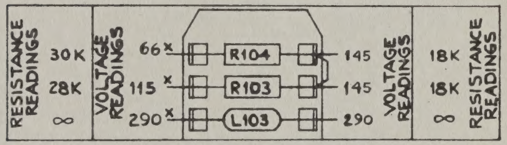
GENERAL NOTES:

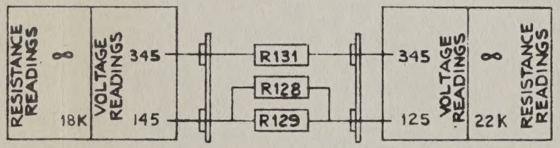
A. ALL VOLTAGE AND RESISTANCE VALUES ARE NORMAL; B+ VOLTAGE MAY VARY ±10%, THE REMAINING READINGS MAY VARY ±20% DEPENDING UPON COMPONENT PART TOLERENCES AND POWER SUPPLY MODEL VARIATIONS. VOLTAGES TO BE MEASURED WITH PRIMARY POWER INPUT VOLTAGE OF APPROXIMATELY 6.3 VDC, 12.6 VDC OR 117 VAC UNDER NORMAL "TRANSMIT" CONDITIONS.

B. TUBE V201 USED ON 2-FREQUENCY MODELS ONLY.

BOTTOM VIEW


V201
6AK6
(NOTE B)
V108
6AL5
V107
6BH6
V104
6AK6
V101
6AK6
V102
12AT7
V103
6AU6
V105
2E26
V106
6146


RESISTANCE READINGS
30K
28K
∞
VOLTAGE READINGS
66×
115×
290×
R104
R103
L103
145
145
290
VOLTAGE READINGS
18K
18K
∞
RESISTANCE READINGS


RESISTANCE READINGS
∞
18K
VOLTAGE READINGS
345
145
R131
R128
R129
345
125
VOLTAGE READINGS
∞
22K
RESISTANCE READINGS

VOLTAGE CHART NOTES:

1. ALL READINGS TAKEN WITH RESPECT TO GROUND. VOLTAGE MEASUREMENTS TO BE MADE WITH A VACUUM TUBE VOLTMETER.
× 2. READINGS TAKEN WITH 1 MEG. RESISTOR IN SERIES WITH METER LEAD.
3. MICROPHONE IN CIRCUIT.
4. VOLTAGE READINGS FOR V101 AND V102 ARE TAKEN WITH FREQUENCY SWITCH IN APPLICABLE POSITION ON 2-FREQUENCY UNITS.
5. METERING TEST SET NOT CONNECTED.

VOLTAGE										TUBE LEGEND	RESISTANCE									
TUBE SOCKET PIN NUMBERS											TUBE SOCKET PIN NUMBERS									
1	2	3	4	5	6	7	8	9	CAP		1	2	3	4	5	6	7	8	9	CAP
-17×	0	FIL.	FIL.	68×	130	0				6AK6 NO.1 FREQ. OSC. V101	100K	0	FIL.	FIL.	30K	28K	6‡			
-17×	0	FIL.	FIL.	68×	130	0				6AK6 NO.2 FREQ. OSC. V201 (NOTE B)	100K	0	FIL.	FIL.	30K	28K	6‡			
285×	0×	5.3	FIL.	FIL.	260×	-2.5×	2.6	FIL.		12AT7 MOD. BUF.-DOUB. V102	∞	180*	1K	FIL.	FIL.	∞	100K	270	FIL.	
-10×	0	FIL.	FIL.	285×	145	0				6AU6 TRIPLER V103	100K	0	FIL.	FIL.	∞	∞	0			
-7.0×	0	FIL.	FIL.	280×	170	0				6AK6 2ND. DOUBLER V104	100K	0	FIL	FIL.	∞	∞	0			
0	FIL.	110	0	-25×	0	FIL.	0		360×	2E26 DOUBLER-DRIVER V105	0	FIL.	40K	0	500K	0	FIL.	0		∞
0	FIL.	130	0	-35×	0	FIL.	0		360×	6146 FINAL AMPL. V106	0	FIL.	26K	0	45K	0	FIL.	0		∞
0×	2.5	FIL.	FIL.	210	135	0				6BH6 AUDIO AMPL. V107	240K	820	FIL.	FIL.	∞	∞	0			
86	86	FIL.	FIL.	86	0	86				6AL5 CLIPPER V108	680K	∞	FIL.	FIL.	680K	0	∞			

RESISTANCE CHART NOTES:

1. ALL READINGS TAKEN WITH RESPECT TO GROUND. MEASUREMENTS TO BE MADE WITH A VACUUM TUBE VOLTMETER.
2. TRANSMITTER UNIT CONNECTED TO POWER SUPPLY. ALL TUBES IN SOCKETS AND METERING TEST SET NOT CONNECTED.
3. NO FILAMENT VOLTAGE APPLIED TO UNIT.
4. NEGATIVE PROBE OF OHMMETER CONNECTED TO GROUND.
* 5. THIS READING WILL VARY WITH ADJUSTMENT OF R130.
‡ 6. READINGS FOR 1 AND 2 FREQUENCY OPERATION WITH FREQUENCY SWITCH IN APPLICABLE POSITION.
7. MICROPHONE NOT IN CIRCUIT.
8. AN INITIAL LOW READING MAY BE OBTAINED AT MANY POINTS DUE TO THE CHARGING OF CAPACITORS IN THE POWER SUPPLY. PERMIT CAPACITORS TO CHANGE TO OBTAIN FINAL READING.

VOLTAGE						TRANSFORMER NO.	RESISTANCE					
TUBE SOCKET PIN NUMBERS							TRANSFORMER BASE PIN NUMBERS					
1	2	3	4	5	6		1	2	3	4	5	6
260×	0	-0.52	-10×	0	290	T1 (AA5)	∞	0	2.2K	100K	0	∞
282×	0	-0.3	-6.0×	0	290	T2 (AA6)	∞	0	1K	100K	0	∞

PART NO. 63D836079
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MOTOROLA SCHEMATIC DIAGRAM
MODEL TA139 SERIES, 152-174 MC.
UNIVERSAL 25 WATT TRANSMITTERS

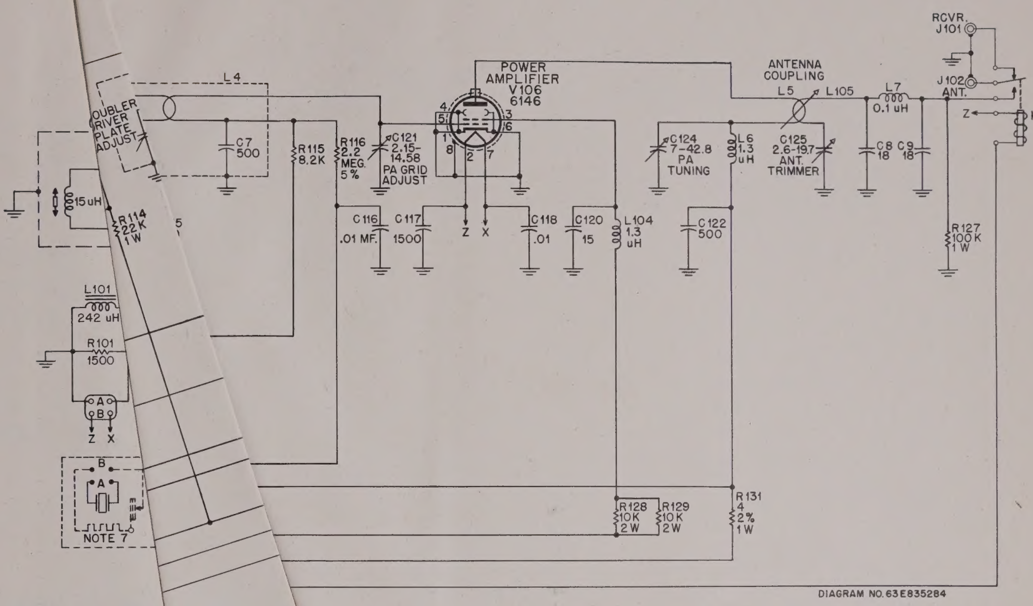
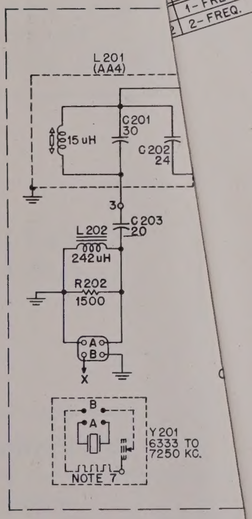

L4
OUBLER
RIVER
PLATE
ADJUST
15 uH
R114
22 K
1 W
C7
500
R115
8.2K
R116
2.2
MEG.
5%
C121
2.15-
14.58
PA GRID
ADJUST
POWER
AMPLIFIER
V106
6146
C116
.01 MF.
C117
1500
Z
X
C118
.01
C120
15
L104
1.3
uH
C124
7-42.8
PA
TUNING
L6
1.3
uH
ANTENNA
COUPLING
L5
L105
C125
2.6-19.7
ANT.
TRIMMER
C122
500
L7
0.1 uH
C8
18
C9
18
RCVR.
J101
J102
ANT.
K101
R127
100 K
1 W
L101
242 uH
R101
1500
A
B
Z
X
NOTE 7
R128
10K
2W
R129
10 K
2W
R131
4
2%
1W

DIAGRAM NO. 63E835284

CHANNELS	BASIC
1- FREQ.	TU187
2- FREQ.	TU187

IDE


L201
(AA4)
15 uH
C201
30
C202
24
3
C203
20
L202
242uH
R202
1500
A
B
X
NOTE 7
Y201
6333 TO
7250 KC.

TES:

1. ALL RESISTOR VALUES ARE IN OHMS, ± 10%, 1/2 WATT UNLESS OTHERWISE SPECIFIED. K= 1000 OHMS.

ALL CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS OTHERWISE SPECIFIED. MF = MICROFARADS.

CAPACITOR C123 IS CONNECTED TO POSITION #1 FOR MILITARY MICROPHONE INPUT OR TO POSITION #2 FOR HANDSET INPUT. EFER TO "AUDIO SENSITIVITY CONNECTIONS" IN THE RANSMITTER INSTRUCTIONS FOR SPECIFIC DETAILS.

OUND CONNECTION IN V101 CATHODE CIRCUIT USED SINGLE FREQUENCY MODELS ONLY.

ED CIRCUITRY AND 200 SERIES COMPONENTS ARE PORATED ON TWO FREQUENCY MODELS ONLY.

E DRIVER PLATE LEAD (RED-BLU.-YEL.) CONNECTED TO AL # 7 OF ASSOCIATED POWER SUPPLY FOR 25 WATT TIONS; CONNECTED TO TERMINAL #10 FOR 10 WATT IONS.

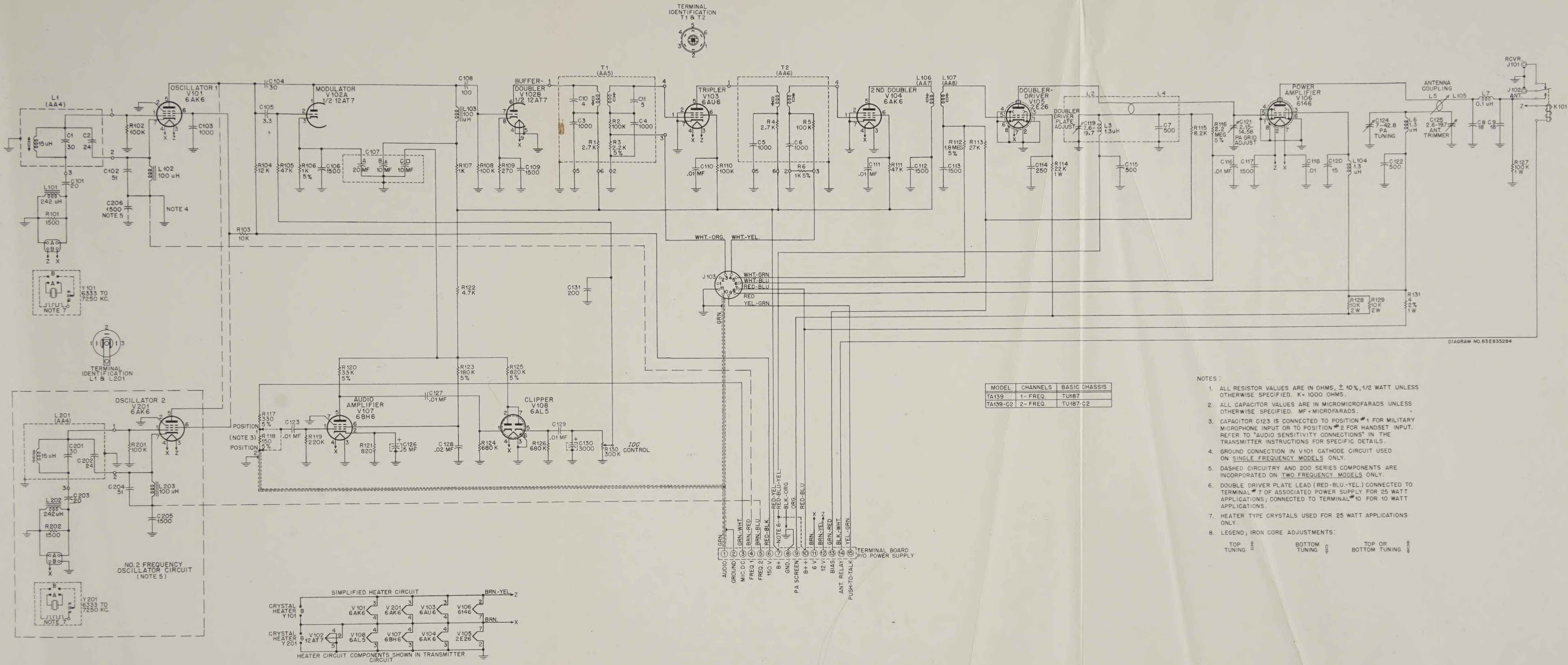
YPE CRYSTALS USED FOR 25 WATT APPLICATIONS

ON CORE ADJUSTMENTS:

BOTTOM TUNING ⇩   TOP OR BOTTOM TUNING ⇕

PART NO. 63E835284
ISSUE - O 3/54-RS

MOTOROLA SCHEMATIC DIAGRAM
MODEL TA139 SERIES, 152-174 MC.
UNIVERSAL 25 WATT TRANSMITTERS


TERMINAL IDENTIFICATION T1 & T2
L1 (AA4)
OSCILLATOR 1 V101 6AK6
MODULATOR V102A 1/2 12AT7
BUFFER-DOUBLER V102B 1/2 12AT7
T1 (AA5)
TRIPLER V103 6AU6
T2 (AA6)
2ND DOUBLER V104 6AK6
L106 (AA7)
L107 (AA8)
DOUBLER-DRIVER V105 2E26
DOUBLER DRIVER PLATE ADJUST
PA GRID ADJUST
POWER AMPLIFIER V106 6146
PA TUNING
ANTENNA COUPLING
ANT. TRIMMER
RCVR. J101
J102 ANT.
K101
NOTE 4
NOTE 5
Y101 6333 TO 7250 KC.
NOTE 7
TERMINAL IDENTIFICATION L1 & L201
WHT.-ORG.
WHT.-YEL.
J103
WHT-GRN.
WHT-BLU
RED-BLU
RED
YEL-GRN.
OSCILLATOR 2 V201 6AK6
L201 (AA4)
Y201 6333 TO 7250 KC.
NO.2 FREQUENCY OSCILLATOR CIRCUIT (NOTE 5)
POSITION 1
(NOTE 3)
POSITION 2
AUDIO AMPLIFIER V107 6BH6
CLIPPER V108 6AL5
IDC CONTROL
TERMINAL BOARD P/O POWER SUPPLY
AUDIO
GROUND
MIC. D.C.
FREQ. 1
FREQ. 2
150 V
B+
GND.
PA SCREEN
B++
6 V
12 V
BIAS
ANT. RELAY
PUSH-TO-TALK
SIMPLIFIED HEATER CIRCUIT
CRYSTAL HEATER Y101
CRYSTAL HEATER Y201
BRN-YEL
BRN.
HEATER CIRCUIT COMPONENTS SHOWN IN TRANSMITTER CIRCUIT
DIAGRAM NO. 63E835284

MODEL	CHANNELS	BASIC CHASSIS
TA139	1- FREQ.	TU187
TA139-C2	2- FREQ.	TU187-C2

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS, ± 10%, 1/2 WATT UNLESS OTHERWISE SPECIFIED. K= 1000 OHMS.
2. ALL CAPACITOR VALUES ARE IN MICROMICROFARADS UNLESS OTHERWISE SPECIFIED. MF = MICROFARADS.
3. CAPACITOR C123 IS CONNECTED TO POSITION #1 FOR MILITARY MICROPHONE INPUT OR TO POSITION #2 FOR HANDSET INPUT. REFER TO "AUDIO SENSITIVITY CONNECTIONS" IN THE TRANSMITTER INSTRUCTIONS FOR SPECIFIC DETAILS.
4. GROUND CONNECTION IN V101 CATHODE CIRCUIT USED ON SINGLE FREQUENCY MODELS ONLY.
5. DASHED CIRCUITRY AND 200 SERIES COMPONENTS ARE INCORPORATED ON TWO FREQUENCY MODELS ONLY.
6. DOUBLE DRIVER PLATE LEAD (RED-BLU.-YEL.) CONNECTED TO TERMINAL # 7 OF ASSOCIATED POWER SUPPLY FOR 25 WATT APPLICATIONS; CONNECTED TO TERMINAL # 10 FOR 10 WATT APPLICATIONS.
7. HEATER TYPE CRYSTALS USED FOR 25 WATT APPLICATIONS ONLY.
8. LEGEND; IRON CORE ADJUSTMENTS:

TOP TUNING ⇧ BOTTOM TUNING ⇩ TOP OR BOTTOM TUNING ⇳

PART NO. 63E835284
ISSUE - O 3/54-R

Motorola®

THE "RESEARCH" LINE

UNIVERSAL
VIBRATOR POWER SUPPLY CHASSIS

MODEL	PRIMARY POWER SOURCE	APPLICATION
TU212	6.3 VDC or 12.6 VDC	Single or two-frequency, trunk mount, 10 watt mobile stations
TU212-F	6.3 VDC or 12.6 VDC	Single or two-frequency, front mount, 10 watt mobile stations

NOMINAL PERFORMANCE SPECIFICATIONS

MODELS	TU212, TU212-F
PRIMARY POWER SOURCE	6.3 VDC or 12.6 VDC
VOLTAGE RATINGS	Receiver Section: 200 vdc at 60 ma. Transmitter Section: 140 vdc at 15 ma. 270 vdc at 40 ma. 335 vdc at 120 ma. -17 vdc Bias
DIMENSIONS	15" long x 3" wide x 5-1/4" high
WEIGHT	9 lbs.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Motorola Communications and Electronics Division
4545 Augusta Blvd. Chicago 51, Illinois

Printed in U.S.A.
3/54

1. DESCRIPTION

MOTOROLA Models TU212 and TU212-F are universal type mobile power supplies expressly designed for use with MOTOROLA 10 Watt Two-Way Radio equipment, utilizing the UNIVERSAL UNI-CHANNEL type receiver. These heavy duty power chassis include a dual interrupter non-synchronous vibrator, a multi-winding input transformer, three selenium rectifier DC voltage supply circuits and a "transmit - receive" control relay. All necessary voltages for operation of the transmitter and receiver of 10 watt mobile station models are supplied by these chassis.

Model TU212 Power Supply incorporates a 19 contact male receptacle to facilitate interconnection with the female plug on the end of the power and control cable of trunk mount mobile radio installations. The TU212-F is designed specifically for use with front mount equipment and will require that power and control connections be made directly from the equipment control panel to specific terminals on the power supply chassis. With exception of termination facilities, the TU212 and TU212-F Power Supply Chassis are identical.

Universal design permits operation of these power supply chassis from either a 6.3 VDC or 12.6 VDC vehicular battery source and with either single or two-frequency mobile radio equipment. This diversified application is accomplished by use of an applicable cable kit and/or control unit to accommodate the desired operation.

Both the TU212 and TU212-F Power Supplies employ a single heavy duty type vibrator requiring a relatively low input power. The three selenium rectifier circuits provide transmitter high (B++) voltage (top circuit shown on diagram), transmitter/receiver B+ voltage (middle circuit), and transmitter bias voltage respectively. Filament voltage is 6 volts for either 6.3 VDC or 12.6 VDC battery operation.

A "transmit-receive" relay is incorporated on these power supplies to facilitate "push-to-talk" operation of the mobile equipment from the control unit. All transmitter and receiver switching functions are performed by means of this relay. Power supply fusing is provided by two 15 ampere cartridge type fuses connected in the primary input circuit of the power supply chassis.

2. SCHEMATIC DIAGRAM PARTS LIST

Models: TU212 Vibrator Power Supply (10 Watt) Trunk Mount
TU212-F Vibrator Power Supply (10 Watt) Front Mount

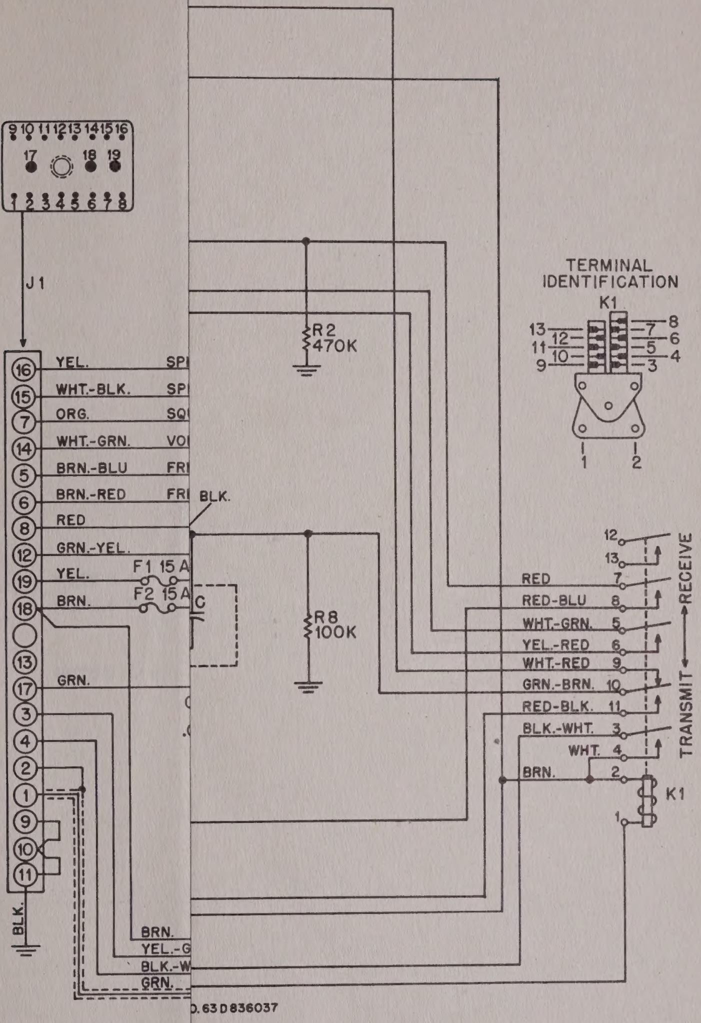
REFERENCE:
Schematic Diagrams
TU212 63D836037
TU212-F 63D836038

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITORS,
C 1	23K831647	Fixed: electrolytic; tubular; 1 section; 50 mf +100-10%; 32 vdcw
C 2		Same as C 1
C 3		Same as C 1
C 4	8B800146	Fixed: oil filled; tubular; .06 mf ±10%; 1600 vdcw
C 5	21R401029	Fixed: ceramic; disc; shielded; .02 mf +80-20%; 500 vdcw
C 6		Same as C 5
C 7	23K483807	Fixed: electrolytic; tubular; 1 section 25 mf +100-10%; 25 vdcw
C 8	23K825606	Fixed: electrolytic; tubular; 3 section; consisting of:
C 8A		⌓ 50 mf +50-10%; 450 vdcw; section
C 8B		□ 50 mf +50-10%; 300 vdcw; section
C 8C		△ 30 mf +50-10%; 300 vdcw; section
C 9	21R115393	Fixed: ceramic; disc; dual; shielded; consisting of:
C 9A		.01 mf GMV; 500 vdcw; section
C 9B		.01 mf GMV; 500 vdcw; section
C 10		Same as C 7
		RECTIFIERS,
CR 1	48B90140	Metallic: selenium; 6 plate
CR 2		Same as CR 1
CR 3		Same as CR 1
CR 4		Same as CR 1
CR 5		Same as CR 1
CR 6		Same as CR 1
CR 7		Same as CR 1
CR 8		Same as CR 1
CR 9	48B830268	Metallic: selenium; 1 plate

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		VIBRATOR,
E 1	48C830082	Dual interrupter type; 6 volt; 7 contact male plug-in base
		FUSE,
F 1	65K4165	Cartridge: one time; glass; 15 ampere; 32 volt; 1-1/4" lg. x 1/4" diameter
F 2		Same as F 1
		LAMP,
I 1	65X10867	Incandescent: 6-8 volt; .25 ma.; single contact miniature bayonet base; tubular glass; type 44
		CONNECTOR,
J 1	28C802820	Receptacle: male; 19 contact; polarized; rectangular molded mica filled plastic base; chassis mounted; used only in Model TU212 (Rear Mounting)
		RELAY,
K 1	80K831612	Armature: 6 volt; dual stack; contact arrangement; 1st stack; 1 form "A" and 1 form "C"; 2nd stack, 3 form "A", does not include 15A811737 COVER, relay or 7A811735 BRACKET, relay cover mounting; which must be ordered separately
		COIL,
L 1	24A812763	RF: choke; 120 microhenries
		REACTOR,
L 2	25B825358	Filter: 2.3 henries at 100 ma. dc
		RESISTORS,
R 1	6R5553	Fixed: carbon; 47 ohm ±10%; 1 w; ins.
R 2	6R6459	Fixed: carbon; 470,000 ohm ±10%; 1 w; ins.
R 3	6R6336	Fixed: carbon; 270 ohm ±10%; 1 w; ins.
R 4		Same as R 3
R 5	6R6415	Fixed: carbon; 100 ohm ±10%; 1 w; ins.
R 6		Same as R 5
R 7		Same as R 5
R 8	6R6328	Fixed: carbon; 100,000 ohm ±10%; 1 w; ins.
R 9	6R5732	Fixed: carbon; 15,000 ohm ±10%; 2 w; ins.
R 10	6R2029	Fixed: carbon; 3300 ohm ±10%; 2 w; ins.
R 11		Same as R 10
R 12	6R6409	Fixed: carbon; 2200 ohm ±10%; 1 w; ins.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		TRANSFORMER,
T 1	25C800136	Power: vibrator; 6 volt; consists of: Primary #1: BLK, GRN and BLK-YEL center tapped conductors Primary #2: YEL, RED and RED-YEL center tapped conductors Secondary #1: BRN and GRN conductors Secondary #2: BLK-GRN and BLK conductors Secondary #3: BLU-YEL and BLU conductors
		BOARD,
TB 1	31B802699	Terminal: 14 soldering lug terminals
TB 2		Same as TB 1
		SOCKET,
XE 1	9A6776	Vibrator: female; 7 contact; molded black bakelite base; saddle mounting
		FUSEHOLDER,
XF 1, 2	31K835455	Dual fuse mounting; rectangular black bakelite base; chassis mounted; for 1-1/4" long x 1/4" diameter fuses
		LAMPHOLDER,
XI 1	9A813001	Miniature single contact molded phenolic bayonet base; includes BLUE and RED conductor

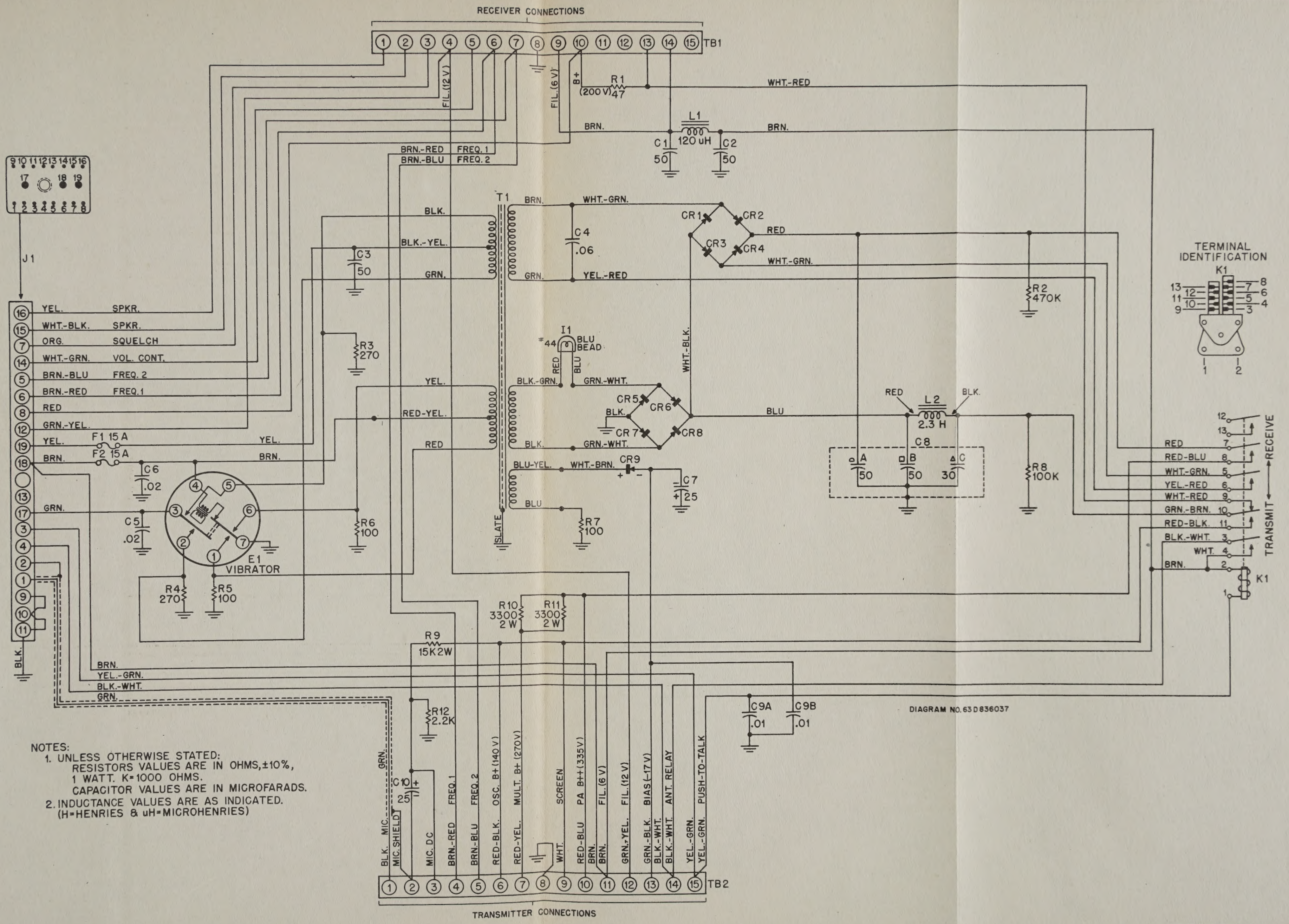
MOTOROLA SCHEMATIC DIAGRAM
MODEL TU212 POWER SUPPLY


9 10 11 12 13 14 15 16
17 18 19
1 2 3 4 5 6 7 8
J1
16 YEL. SP
15 WHT.-BLK. SP
7 ORG. SQ
14 WHT.-GRN. VO
5 BRN.-BLU FR
6 BRN.-RED FR
8 RED
12 GRN.-YEL.
19 YEL. F1 15 A
18 BRN. F2 15 A
C
13
17 GRN.
3
4
2
1
9
10
11
BLK.
BLK.
R2 470K
R8 100K
BRN.
YEL.-G
BLK.-W
GRN.
).63D836037
TERMINAL IDENTIFICATION
K1
13 12 11 10 9
8 7 6 5 4 3
1 2
12
13
RED 7
RED-BLU 8
WHT.-GRN. 5
YEL.-RED 6
WHT.-RED 9
GRN.-BRN. 10
RED-BLK. 11
BLK.-WHT. 3
WHT. 4
BRN. 2
1
K1
RECEIVE
TRANSMIT

NOTES:
1. UNLESS OTH
RESISTOR
1 WATT. K
CAPACITO
2. INDUCTANCE
(H=HENRIES

PART NO. 63D836037
ISSUE - O 3/54-UM

MOTOROLA SCHEMATIC DIAGRAM
MODEL TU212 POWER SUPPLY


RECEIVER CONNECTIONS
TB1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
FIL. (12 V)
FIL. (6 V)
B+
(200 V)
R1
47
WHT.-RED
L1
120 uH
BRN.
C1
50
C2
50
BRN.-RED
FREQ. 1
BRN.-BLU
FREQ. 2
9 10 11 12 13 14 15 16
17 18 19
1 2 3 4 5 6 7 8
J1
T1
BLK.
BLK.-YEL.
GRN.
C3
50
C4
.06
WHT.-GRN.
YEL.-RED
CR1
CR2
CR3
CR4
RED
WHT.-GRN.
R2
470K
TERMINAL IDENTIFICATION
K1
13 12 11 10 9
8 7 6 5 4 3
1 2
YEL. SPKR.
WHT.-BLK. SPKR.
ORG. SQUELCH
WHT.-GRN. VOL. CONT.
BRN.-BLU FREQ. 2
BRN.-RED FREQ. 1
RED
GRN.-YEL.
YEL.
BRN.
16 15 7 14 5 6 8 12 19 18 13 17 3 4 2 1 9 10 11
F1 15 A
F2 15 A
R3
270
I1
#44
BLU BEAD
RED
BLU
WHT.-BLK.
YEL.
RED-YEL.
BLK.-GRN.
GRN.-WHT.
CR5
CR6
CR7
CR8
BLK.
BLU
RED
L2
2.3 H
BLK.
C8
A 50
B 50
C 30
R8
100K
GRN.-WHT.
BLU-YEL.
WHT.-BRN.
CR9
C7
25
BLU
R7
100
SLATE
C6
.02
C5
.02
E1
VIBRATOR
R6
100
R4
270
R5
100
GRN.
RED
RED-BLU
WHT.-GRN.
YEL.-RED
WHT.-RED
GRN.-BRN.
RED-BLK.
BLK.-WHT.
WHT.
BRN.
12 13 7 8 5 6 9 10 11 3 4 2 1
RECEIVE
TRANSMIT
K1
R10
3300
2 W
R11
3300
2 W
R9
15K2W
BLK.
BRN.
YEL.-GRN.
BLK.-WHT.
GRN.
R12
2.2K
C9A
.01
C9B
.01
DIAGRAM NO.63D836037
GRN.
C10
25
BLK. MIC.
MIC. SHIELD
MIC. DC
BRN-RED FREQ. 1
BRN-BLU FREQ. 2
RED-BLK. OSC. B+ (140 V)
RED-YEL. MULT. B+ (270 V)
WHT.
SCREEN
RED-BLU PA B++ (335 V)
BRN. FIL. (6 V)
BRN.
GRN.-YEL. FIL. (12 V)
GRN.-BLK. BIAS (-17 V)
BLK.-WHT.
BLK.-WHT. ANT. RELAY
YEL.-GRN.
YEL.-GRN. PUSH-TO-TALK
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
TB2
TRANSMITTER CONNECTIONS

NOTES:
1. UNLESS OTHERWISE STATED:
   RESISTORS VALUES ARE IN OHMS, ±10%, 1 WATT. K=1000 OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
2. INDUCTANCE VALUES ARE AS INDICATED. (H=HENRIES & uH=MICROHENRIES)

PART NO. 63D836037
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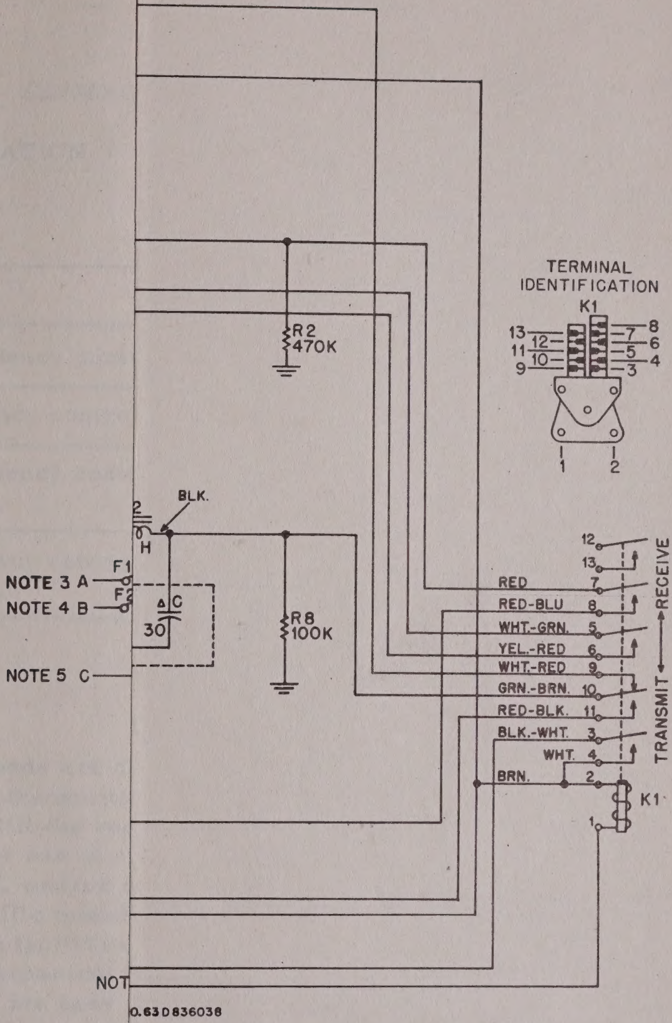
MOTOROLA SCHEMATIC DIAGRAM
MODEL TU212-F POWER SUPPLY


TERMINAL IDENTIFICATION
K1
13 12 11 10 9
8 7 6 5 4 3
1 2
R2 470K
BLK.
2
H
F1
F2
NOTE 3 A
NOTE 4 B
NOTE 5 C
ΔC
30
R8 100K
12
13
RED 7
RED-BLU 8
WHT.-GRN. 5
YEL.-RED 6
WHT.-RED 9
GRN.-BRN. 10
RED-BLK. 11
BLK.-WHT. 3
WHT. 4
BRN. 2
1
K1
RECEIVE
TRANSMIT
NOT
0.63D836038

PART NO. 63D836038
ISSUE - O 3/54-UM

MOTOROLA SCHEMATIC DIAGRAM
MODEL TU212-F POWER SUPPLY

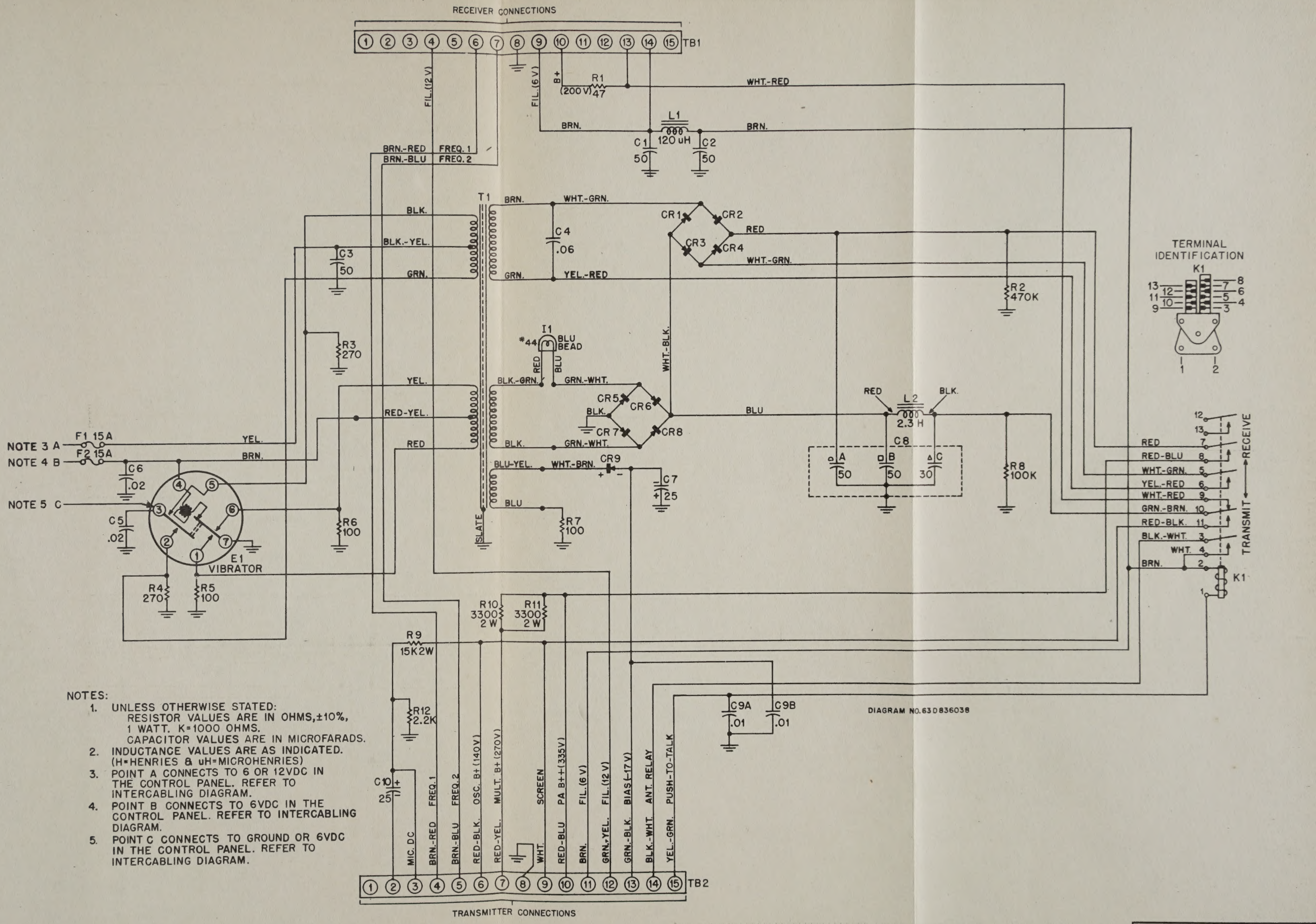

RECEIVER CONNECTIONS
TB1
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮
FIL.(12 V)
FIL.(6 V)
B+
(200 V)
R1
47
WHT.-RED
BRN.
L1
120 uH
C1
50
C2
50
BRN.-RED
BRN.-BLU
FREQ. 1
FREQ. 2
T1
BLK.
BLK.-YEL.
C3
50
GRN.
BRN.
WHT.-GRN.
C4
.06
GRN.
YEL.-RED
CR1
CR2
CR3
CR4
RED
WHT.-GRN.
R2
470K
R3
270
I1
#44
BLU BEAD
RED
BLU
WHT.-BLK.
YEL.
RED-YEL.
RED
BLK.-GRN.
GRN.-WHT.
CR5
CR6
CR7
CR8
BLK.
BLK.
GRN.-WHT.
BLU
RED
L2
BLK.
2.3 H
C8
A
50
B
50
C
30
R8
100K
BLU-YEL.
WHT.-BRN.
CR9
C7
25
BLU
R7
100
SLATE
NOTE 3 A
F1 15A
NOTE 4 B
F2 15A
YEL.
BRN.
C6
.02
NOTE 5 C
C5
.02
R6
100
E1
VIBRATOR
R4
270
R5
100
R10
3300
2 W
R11
3300
2 W
R9
15K2W
R12
2.2K
C10
25
C9A
.01
C9B
.01
TERMINAL IDENTIFICATION
K1
13 12 11 10 9
8 7 6 5 4 3
1 2
RED 7
RED-BLU 8
WHT.-GRN. 5
YEL.-RED 6
WHT.-RED 9
GRN.-BRN. 10
RED-BLK. 11
BLK.-WHT. 3
WHT. 4
BRN. 2
12
13
1
K1
RECEIVE
TRANSMIT
MIC. DC
BRN.-RED FREQ. 1
BRN.-BLU FREQ. 2
RED-BLK. OSC. B+ (140 V)
RED-YEL. MULT. B+ (270 V)
WHT. SCREEN
RED-BLU PA B++(335 V)
BRN. FIL. (6 V)
GRN.-YEL. FIL. (12 V)
GRN.-BLK. BIAS (-17 V)
BLK.-WHT. ANT. RELAY
YEL.-GRN. PUSH-TO-TALK
TB2
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮
TRANSMITTER CONNECTIONS

DIAGRAM NO. 63D836038

NOTES:

1. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, ±10%, 1 WATT. K=1000 OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
2. INDUCTANCE VALUES ARE AS INDICATED. (H=HENRIES & uH=MICROHENRIES)
3. POINT A CONNECTS TO 6 OR 12VDC IN THE CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.
4. POINT B CONNECTS TO 6VDC IN THE CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.
5. POINT C CONNECTS TO GROUND OR 6VDC IN THE CONTROL PANEL. REFER TO INTERCABLING DIAGRAM.

PART NO. 63D836038
ISSUE - O 3/54-UM

CONTROL HEADS

MOBILE STATION 6/12 VDC OPERATION

MODEL	DESCRIPTION
TU124	Single-frequency control head with military type microphone.
TU124-C2	Two-frequency control head with military type microphone.
TU203	Single-frequency control head with microphone connector, less microphone.
TU203-C2	Two-frequency control head with microphone connector, less microphone.

1. DESCRIPTION

MOTOROLA control heads are designed to provide complete control facilities for 2-way mobile transmitter and receiver installations. Various models are available to fulfill the requirements of diversified applications. Model variations involve the use of an integral microphone external microphone or handset connector, and/or two-frequency selector switch. Refer to the model chart for specific model identification. All control heads feature self-contained junction facilities for control cable, speaker, and microphone connections. The mechanical design allows versatile mounting with adjustable angle provisions for easy access to the controls.

The green "Power On-Off" pilot indicator is wired in series with the "A" power relay as a visual indication of proper operation of the relay. When the "Power On-Off" switch is turned "on", illumination of the pilot lamp indicates that the "A" power relay is closed, completing the filament circuits. When the "Power On-Off" switch is turned "off" the green pilot indicator will go out, indicating that the "A" power relay has de-energized.

The two-frequency control head is identified with a -C2 suffix and is identical to the corresponding single-frequency model except for the addition of a two-frequency switch and associated leads. The two-frequency selector switch provides for manual selection of either of two operating channels. In transmitter-receiver models where both units are of the two-frequency type, the selection is simultaneous. For individual selection of transmitter and receiver channels, special control head facilities will be required.

The standard control facilities include:

a. Variable VOLUME control with power "On-Off" Switch.

b. Variable SQUELCH control.

c. Green "Power On-Off" pilot indicator.

d. Red "Transmit On-Off" pilot indicator.

The TU203 Series Control Heads are supplied with provisions for connection of a military or noise cancelling type microphone or a telephone type handset. The MOTOROLA P-255-E military type and P-7255-A noise cancelling type microphones or the P-278-F Handset recommended for this purpose. These items must be ordered separately as required.

Refer to Schematic Diagram 63C830571 for complete wiring details of the TU124 Series Control Head.

Refer to Schematic Diagram 63C836021 for complete wiring details of the TU203 Series Control Head.

2. TRANSMITTER INPUT CONSIDERATION

When a control head with military microphone is used, the shielded input lead to the grid of the 1st IDC amplifier on the transmitter must be connected to the Pos. 1 tap on the input divider (see applicable transmitter schematic diagram). When a control head with handset is used, the shielded lead must be connected to Pos. 2 on the divider network.

NOTE

If a handset is ordered with a mobile station incorporating a TU203 Series Control Head, the transmitter will be wired for handset operation at the factory. If the mobile station is ordered without a handset, or with either a military or noise cancelling type microphone, the transmitter will be connected for microphone input.

2. SCHEMATIC DIAGRAM PARTS LIST

REFERENCE:
Schematic Diagrams:
TU124 Series 63C830571
TU203 Series 63C836021

a. TU124 Series Control Head and Microphone TU203 Series Control Head (Less Microphone)

Ref. Symbol	Motorola Pt. No.	Description
		LAMPS,
I 1	65X4151	Incandescent: 6-8 volt; 1 candle power; miniature single contact bayonet base; globe shaped bulb
I 2		Same as I 1
		CONNECTOR,
J 1	9B16345	Receptacle: female; 4 contact; polarized; round chassis mounted base; used only on TU203 series models
		MICROPHONE,
MK 1	50B890923	Carbon: single button; Military type; push-to-talk switch; includes reference part W 1; used only on TU124 series models
		RESISTORS,
R 1	18A822301	Variable: carbon; 500,000 ohm ±10%; 2.25 w; includes reference part S 1
R 2	18A890193	Variable: wire wound; 10,000 ohm ±10%
R 3	6R6336	Fixed: carbon; 270 ohm ±10%; 1 w; ins.; used only on TU203 series models
		SWITCHES,
S 1		S.P.S.T.; p/o R 1
S 2	40A80248	Toggle: S.P.D.T.; used only on (-C2) 2-freq. models
	or 40K811753	Toggle: S.P.D.T.; used only on (-C2) 2-freq. models
		BOARDS,
TB 1	31B893462	Terminal: 27 female contacts; soldering lug type
TB 2	31A890699	Terminal: 6 screw terminals

Ref. Symbol	Motorola Pt. No.	Description
		CORD,
W 1	30B891505	Microphone: coiled cord; tinsel; 4 conductor; rubber covered; conductors color coded and numbered bands; RED, #1; BLACK, #2; GREEN, #3; WHITE, #4; each conductor with spade terminal lug on one end; stripped only on other end; includes strain clip; p/o MK 1; used only on TU124 series models
		LIGHTS,
XI 1	60A890181	Indicator, miniature single contact bayonet base; RED lens
XI 2	60K890479	Indicator, miniature single contact bayonet base; GREEN lens

b. Optional Accessories (Not Supplied)

(1) P-278-F Handset Microphone

		HANDSET and CABLE ASSEMBLY,
HS 101	1V84353	Consisting of: 59B80214 HANDSET: carbon; transmitter cartridge 30 ohm; receiver cartridge 137 ohm at 1000 cycles or 59K834032 HANDSET: carbon; transmitter cartridge 30 ohm; receiver cartridge 137 ohm at 1000 cycles Includes reference part W 101
		CONNECTOR,
P 101	28A16370	Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o W 101
		HANDSET CABLE ASSEMBLY,
W101	1V84354	Includes: 30K84270 CORD, handset; coiled; 5 conductor; conductors color coded; BLACK, WHITE, RED, GREEN, BLUE; both ends of cord are stripped only Includes reference part P 101

NON-REFERENCED PARTS LIST

Ref. Symbol	Motorola Pt. No.	Description
	51B83300	PHONE HANGER ASSEMBLY
	1V83301	PHONE HANGER MOUNTING PARTS ASSEMBLY, includes: 64A83334 PLATE, reinforcing 3S7453 SCREW, tapping: #8 x 1"; 2 supplied 3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied 4S8411 LOCKWASHER, internal: #8; 2 supplied

(2) P-255-E Military Microphone
P-7255-A Military Microphone (Noise Cancelling)

Ref. Symbol	Motorola Pt. No.	Description
		MICROPHONE,
MK 201	50C822727	Carbon; push-to-talk switch; Military type; includes reference parts P 201 and W 201 (30B822726) (Used only for model P-255-E)
	or 1V475678	MICROPHONE and CONNECTOR ASSEMBLY, Includes: 59B475596 MICROPHONE, carbon; single button; Military type; push-to-talk switch; Includes reference parts W 201 (Assembly used only for model P-7255-A)
		CONNECTOR,
P 201	28A16370	Plug: male; 4 contact; polarized; cylindrical; cabl mounted; p/o MK 201
		CORD,
W 201	30B84269	Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord are stripped only; p/o MK 201 (59B475596) used only in model P-7255-A
	or 30B822726	Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord stripped only; p/o MK 201 (50C822727) used only in model P-255-E

NON-REFERENCED PARTS LIST

Ref. Symbol	Motorola Pt. No.	Description
	1V16241	MICROPHONE MOUNTING PARTS KIT, Includes: 64A85596 PLATE, support 3S8101 SCREW, tapping: 8-15 x 1/2"; 2 supplied

MOTOROLA SCHEMATIC DIAGRAM
TU124 SERIES CONTROL HEADS

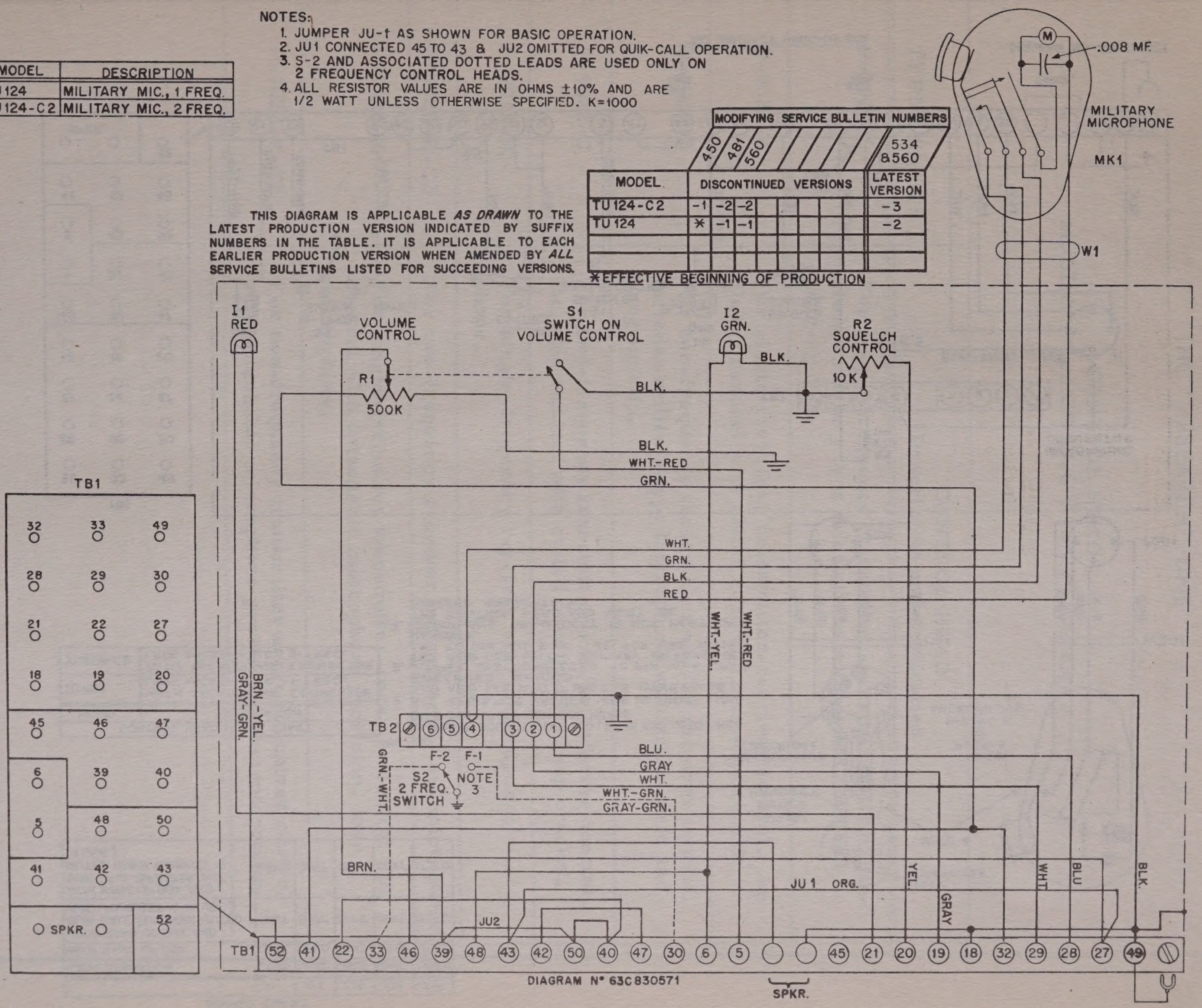
MODEL	DESCRIPTION
TU 124	MILITARY MIC., 1 FREQ.
TU 124-C2	MILITARY MIC., 2 FREQ.

NOTES:
1. JUMPER JU-1 AS SHOWN FOR BASIC OPERATION.
2. JU1 CONNECTED 45 TO 43 & JU2 OMITTED FOR QUIK-CALL OPERATION.
3. S-2 AND ASSOCIATED DOTTED LEADS ARE USED ONLY ON 2 FREQUENCY CONTROL HEADS.
4. ALL RESISTOR VALUES ARE IN OHMS ±10% AND ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED. K=1000

THIS DIAGRAM IS APPLICABLE *AS DRAWN* TO THE LATEST PRODUCTION VERSION INDICATED BY SUFFIX NUMBERS IN THE TABLE. IT IS APPLICABLE TO EACH EARLIER PRODUCTION VERSION WHEN AMENDED BY *ALL* SERVICE BULLETINS LISTED FOR SUCCEEDING VERSIONS.

	MODIFYING SERVICE BULLETIN NUMBERS			
	450	481	560	534 & 560
MODEL	DISCONTINUED VERSIONS			LATEST VERSION
TU 124-C2	-1	-2	-2	-3
TU 124	*	-1	-1	-2

*EFFECTIVE BEGINNING OF PRODUCTION


M
.008 MF.
MILITARY MICROPHONE
MK1
W1
I1 RED
VOLUME CONTROL
R1
500K
S1 SWITCH ON VOLUME CONTROL
I2 GRN.
R2 SQUELCH CONTROL
10 K
BLK.
BLK.
BLK.
WHT.-RED
GRN.
WHT.
GRN.
BLK.
RED
WHT.-YEL.
WHT.-RED
BRN.-YEL.
GRAY-GRN.
TB2
6 5 4 3 2 1
F-2
F-1
S2 2 FREQ. SWITCH
NOTE 3
GRN.-WHT.
BLU.
GRAY
WHT.
WHT.-GRN.
GRAY-GRN.
BRN.
JU 1
ORG.
JU2
YEL.
GRAY
WHT.
BLU
BLK.
TB1
52 41 22 33 46 39 48 43 42 50 40 47 30 6 5 45 21 20 19 18 32 29 28 27 49
SPKR.
DIAGRAM N° 63C830571
TB1
32 33 49
28 29 30
21 22 27
18 19 20
45 46 47
6 39 40
5 48 50
41 42 43
SPKR.
52

PART NO. 63C830571
ISSUE - E 3/54-UM

MOTOROLA SCHEMATIC DIAGRAM
TU203 SERIES CONTROL HEADS

JUMPER CHART

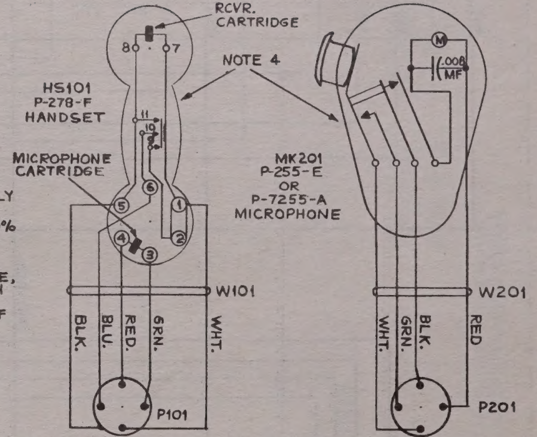
	JU1	JU2	JU3	JU4	JU5
BASIC OPERATION	USED	USED	USED	OMIT	USED
WITH HANG UP BOX	OMIT	USED	OMIT	USED	USED
WITH HANG UP BOX AND QUIK CALL.(SPEAKER MUTED WHEN HANDSET IS IN USE.)	OMIT	OMIT	OMIT	OMIT	USED
WITH HANG UP BOX AND QUIK CALL.(SPEAKER NOT MUTED WHEN HANDSET IS IN USE.)	USED	OMIT	OMIT	OMIT	USED

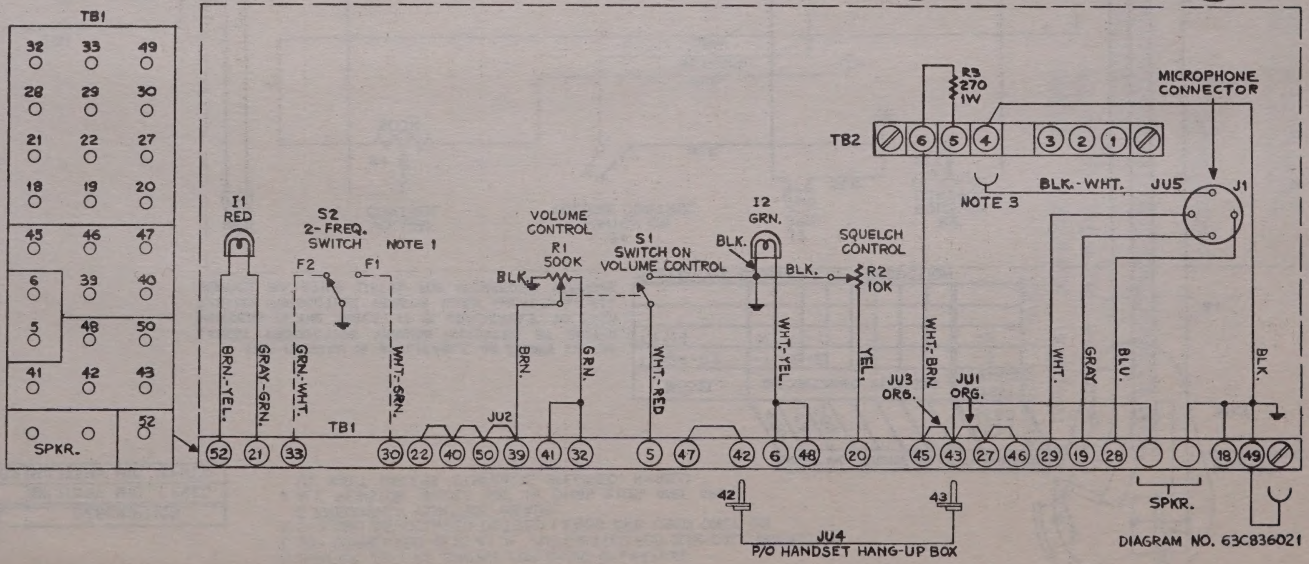
CONTROL HEAD MODEL CHART

MODEL	DESCRIPTION
TU203	WITH MICROPHONE CONNECTOR LESS MICROPHONE, 1-FREQ.
TU203-C2	WITH MICROPHONE CONNECTOR LESS MICROPHONE, 2-FREQ.

NOTES:

1. S2 AND ASSOCIATED DOTTED LEADS ARE USED ONLY ON 2-FREQUENCY CONTROL HEADS.
2. ALL RESISTOR VALUES ARE IN OHMS ±10% AND ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED. K=1000
3. JUMPER JU5 CONNECTED TO PIN NO. 4 OF TB2 FOR USE WITH MILITARY MICROPHONE, AND TO PIN NO. 5 OF TB2 FOR USE WITH HANDSET.
4. MICROPHONE OR HANDSET IS NOT PART OF THE CONTROL HEAD AND MUST BE ORDERED SEPARATELY.


RCVR. CARTRIDGE
NOTE 4
HS101
P-278-F
HANDSET
MICROPHONE CARTRIDGE
8
7
11
10
1
2
3
4
5
6
MK201
P-255-E
OR
P-7255-A
MICROPHONE
M
.008 MF
W101
W201
BLK.
BLU.
RED.
GRN.
WHT.
WHT.
GRN.
BLK.
RED
P101
P201


TB1
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48
50
41
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43
52
SPKR.
I1
RED
S2
2-FREQ.
SWITCH
NOTE 1
F2
F1
VOLUME CONTROL
R1
500K
BLK.
S1
SWITCH ON VOLUME CONTROL
I2
GRN.
BLK.
BLK.
SQUELCH CONTROL
R2
10K
R3
270
1W
TB2
MICROPHONE CONNECTOR
NOTE 3
BLK.-WHT.
JU5
J1
BRN.-YEL.
GRAY-GRN.
GRN.-WHT.
WHT.-GRN.
BRN.
GRN.
WHT.-RED
WHT.-YEL.
YEL.
WHT.-BRN.
WHT.
GRAY
BLU.
BLK.
JU3
ORG.
JU1
ORG.
JU2
52
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SPKR.
42
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JU4
P/O HANDSET HANG-UP BOX
DIAGRAM NO. 63C836021

PART NO. 63C836021
ISSUE - O 3/54-UM

Motorola®

THE "RESEARCH" LINE

CONTROL HEAD
MOBILE 6.3 OR 12.6 VAC OPERATION

TYPE NUMBER	CONTROL HEAD Description and Application
P-9022	For single-frequency transmitter-receiver control. Includes military type microphone with coiled cord and hang-up clip.
P-9022-A	For single-frequency transmitter-receiver control. Includes handset with coiled cord and hang-up bracket.
P-9022-B	For two-frequency transmitter and/or receiver control. Includes military type microphone with coiled cord and hang-up clip.
P-9022-C	For two-frequency transmitter and/or receiver control. Includes handset with coiled cord and hang-up bracket.
P-9022-H	For single-frequency receiver only control, less microphone.
P-9022-H-C2	For two-frequency receiver only control, less microphone.
P-9022-K	For single-frequency transmitter-receiver control with control with detachable microphone provision, less microphone.
P-9022-K-C2	For two-frequency transmitter and/or receiver control with detachable microphone provision, less microphone.

Motorola Communications and Electronics Division
4545 Augusta Blvd. Chicago 51, Illinois

Printed in U.S.A.
3/54

1. DESCRIPTION

The MOTOROLA P-9022 Series Control Heads with microphones are designed to provide complete dash-mounted control facilities for a mobile transmitter and/or receiver installation. These units feature self-contained junction facilities for control cable, speaker and microphone connections. Mechanical design allows versatile mounting with adjustable angle provisions for easy access to the controls.

a. Receiver Only Control Heads

The P-9022-H and P-9022-H-C2 Control Heads do not include a handset or microphone and are designed primarily for control of receiver only models. However, complete facilities are included for transmitter-receiver control when a handset or microphone is added.

b. Control Heads With Detachable Microphone

The P-9022-K and P-9022-K-C2 Control Heads provide identical control facilities as the P-9022 and P-9022-B Control Heads respectively. The "-K" version Control Heads are unique in the following respects:

(1) A microphone or handset is not supplied.

(2) A 4-prong female microphone receptacle is added to accommodate a detachable type microphone or handset.

The P-255-E Military Microphone, the P-7255-A "Noise Cancelling" microphone, or P-278-F Handset is recommended for use with the "-K" model Control Heads.

c. Standard Control Head Facilities Include

(1) Adjustable VOLUME control with power "on-off" switch.

(2) Variable SQUELCH control.

(3) Green "Power On-Off" pilot indicator.

(4) Red "Transmit On-Off" pilot indicator (no function in P-9022-H and P-9022-H-C2).

All control heads are shipped with 6 volt pilot bulbs installed. For 12 volt operation 6 volt bulbs must be removed and replaced with 12 volt bulbs. A Twelve Volt Bulb Kit is supplied with each 12 Volt Mobile Station.

2. MULTIPLE FREQUENCY CONTROL

For multiple frequency operation a frequency selector switch is provided. The standard two-frequency switch facilities provide for selection of either of two channels. In transmitter-receiver models, where both units are of the two-frequency type, the channel selection is simultaneous. For separate selection of transmitter and receiver channels special instructions and switching are required.

3. TRANSMITTER INPUT CONSIDERATIONS

When a control head with military microphone is used, the shielded input lead to the grid of the 1st IDC amplifier on the transmitter must be connected to the POS. 1 tap on the input divider (see applicable transmitter schematic diagram). When a control head with handset is used, the shielded lead must be connected to POS. 2 on the divider network.

NOTE

If a handset is ordered with a mobile station incorporating a P-9022-H Series or P-9022-K Series Control Head, the transmitter will be wired for handset operation at the factory. If the mobile station is ordered without a handset, or with either a military or noise cancelling type microphone, the transmitter will be connected for microphone input.

4. JUMPER CONSIDERATIONS

Jumper provisions are incorporated on all control heads to accommodate diversified application. Control heads shipped as part of standard mobile station models and/or with specific optional accessories (QUIK-CALL, Hang-Up Box, detachable microphone or handset, etc.) will be jumpered at the factory to facilitate intended operation. Control heads shipped separately, on orders where application is not specified, must be jumpered in the field to accommodate specific operation (all jumpers included on control head when shipped). Refer to applicable control head schematic diagram for proper jumper connections.

5. SCHEMATIC DIAGRAM PARTS LIST

a.	P-9022	Control Head and Microphone (1-Freq.)
	P-9022-A	Control Head and Handset (1-Freq.)
	P-9022-B	Control Head and Microphone (2-Freq.)
	P-9022-C	Control Head and Handset (2-Freq.)
	P-9022-H	Control Head (1-Freq. - Receiver Only) Less Microphone
	P-9022-H-C2	Control Head (2-Freq. - Receiver Only) Less Microphone
	P-9022-K	Control Head (1-Freq.) Less Microphone
	P-9022-K-C2	Control Head (2-Freq.) Less Microphone

Reference:
Schematic Diagrams

P-9022	63C800256	P-9022-H	63C800257
P-9022-A	63C800257	P-9022-H-C2	63C800257
P-9022-B	63C800256	P-9022-K	63C820573
P-9022-C	63C800257	P-9022-K-C2	63C820573

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		LAMPS,
E 1	65X4151	incandescent: 6-8 volt; .20 ampere; round bulb; single contact; bayonet base
E 2		Same as E 1
E 3		NOT USED
		BOARDS,
E 4	31A890699	Terminal: 6 screw terminals
E 5	31B893462	Terminal: 27 female pin receptacles
		HANDSET,
HS 1	1V892375	Assembly; includes: 59B80214 HANDSET: transmitter cartridge; 30 ohm receiver cartridge; 137 ohm or 59K834032 HANDSET: transmitter cartridge; 30 ohm; receiver cartridge, 137 ohm 30B892778 CORD, handset: coiled; tinsel; 5 conductor; includes 10 solder lug terminals and strain clip; reference part W 1 42A85648 CLAMP, cable (Used only on P-9022-A and P-9022-C Control Heads)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		LIGHTS,
I 1	60A890181	Indicator: single contact; bayonet base; RED lens
I 2	60K890479	Indicator: single contact; bayonet base; GREEN lens
		CONNECTOR,
J 1	9B16345	Receptacle: female; 4 contact; round (Used only on P-9022-K & P-9022-K-C2)
		WIRES,
JU 1		For reference only
JU 2		For reference only (used only on P-9022-K Series Control Heads)
JU 3		For reference only (not used on P-9022 & P-9022-B Control Heads)
		LEAD,
JU 4	1V803728	Electrical: jumper; includes: 10M430 WIRE: #20 stranded; black; 2" used 29K890442 CONNECTOR, plug: male; single contact; pin type; coded; #42; 1 used 29K890443 CONNECTOR, plug: male; single contact; pin type; coded; #43; 1 used (Used only with and is p/o K-8439-B Hang-Up Box)
		MICROPHONE,
MI 1	50B890923	Carbon: includes: 30B891505 CORD, microphone: coiled; 4 conductor; tinsel; includes 4 solder lug terminals and strain clip; reference part W 1 (Used on P-9022 and P-9022-B Control Heads)
		RESISTORS,
R 1	18K803868	Variable: wire wound; 20 ohm; includes S.P.S.T. AC Switch reference part S 1
R 2	18A890193	Variable: wire wound; 10,000 ohm ±10%; SQUELCH CONTROL
R 3	6R6336	Fixed: carbon; 270 ohm ±10%; 1 w; ins. (Not used on P-9022 & P-9022-B Control Heads)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		SWITCHES,
S 1		S.P.S.T.; p/o R 1
S 2	40A80248	Toggle: S.P.D.T.; 2-frequency selector
	or 40K811753	Toggle: S.P.D.T.; 2-frequency selector (Used only on P-9022-B, P-9022-C, P-9022-H-C2 and P-9022-K-C2 Control Heads)
		CORD,
W 1	30B891505	Microphone: coiled; 4 conductor; tinsel; includes 4 solder lug terminals and strain clip; p/o MI 1 (Used only on P-9022 and P-9022-B Control Heads)
	or 30B892778	Handset: coiled; 5 conductor; tinsel; includes 10 solder lug terminals and strain clip; p/o HS 1 (Used only on P-9022-A & P-9022-C Control Heads)

b. Optional Accessories (not supplied)

(1) P-278-F Handset Microphone

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		HANDSET and CABLE ASSEMBLY,
HS 101	1V84353	Consisting of: 59B80214 HANDSET: carbon; transmitter cartridge, 30 ohm; receiver cartridge 137 ohm at 1000 cycle or 59K834032 HANDSET: carbon; transmitter cartridge 30 ohm; receiver cartridge 137 ohm at 1000 cycle Includes reference part W 101
		CONNECTOR,
P 101	28A16370	Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o W 101
		HANDSET CABLE ASSEMBLY,
W 101	1V84354	Includes: 30K84270 CORD, handset: coiled; 5 conductor; conductors color coded; BLACK, WHITE, RED, GREEN, BLUE; both ends of cord are stripped only Includes reference part P 101

(2) P-255-E Military Microphone
P-7255-A Military Microphone (Noise Cancelling)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		MICROPHONE,
MK 201	50C822727	Carbon: push-to-talk switch; Military Type; includes reference parts P 201 and W 201 (30B822726) (Used for Model P-255-E)
	or 1V475678	MICROPHONE and CONNECTOR ASSEMBLY: Includes: 59B475596 MICROPHONE, carbon: single button; Military Type; push-to-talk switch; includes reference part W 201 (Assembly used only for model P-7255-A)
		CONNECTOR,
P 201	28A16370	Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o MK 201
		CORD,
W 201	30B84269	Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord are stripped only; p/o MK 201 (59B475596) used only in model P-7255-A
	or 30B822726	Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord stripped only; p/o MK201 (50C822727) used only in model P-255-E

c. Non-Referenced Parts List

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		MICROPHONE MOUNTING PARTS KIT,
	1V16241	Supplied with models P-255-E and P-7255-A; includes: 64A85596 PLATE, support 3S8101 SCREW, tapping: 8-15 x 1/2"; 2 supplied
		PHONE HANGER ASSEMBLY,
	51B83300	Supplied with model P-278-F; requires 1V83301 Mounting Parts Kit
		PHONE HANGER MOUNTING PARTS KIT,
	1V83301	Supplied with model P-278-F; used with 51B83300 PHONE HANGER ASSEMBLY includes: 64A83334 PLATE, reinforcing 3S7453 SCREW, tapping: #8 x 1"; 2 supplied

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied
		4S8411 LOCKWASHER, internal; #8; 2 supplied
		LENS,
	60K890184	Indicator light: RED
	60K890588	Indicator light: GREEN

MOTOROLA SCHEMATIC DIAGRAM
MODELS P-9022 AND P-9022-B CONTROL HEADS

NOTES:
1. JUMPER JU-1 AS SHOWN FOR BASIC OPERATION.
2. JUMPER JU-1 NOT USED FOR OPERATION WITH HANG-UP SWITCH BOX.
3. JUMPER JU-1 CONNECTED TO REF. TERMINALS 45 & 43 FOR QUIK-CALL OPERATION.
4. 2-FREQUENCY LEADS AND SWITCH S-2 ARE PART OF P-9022-B ONLY.

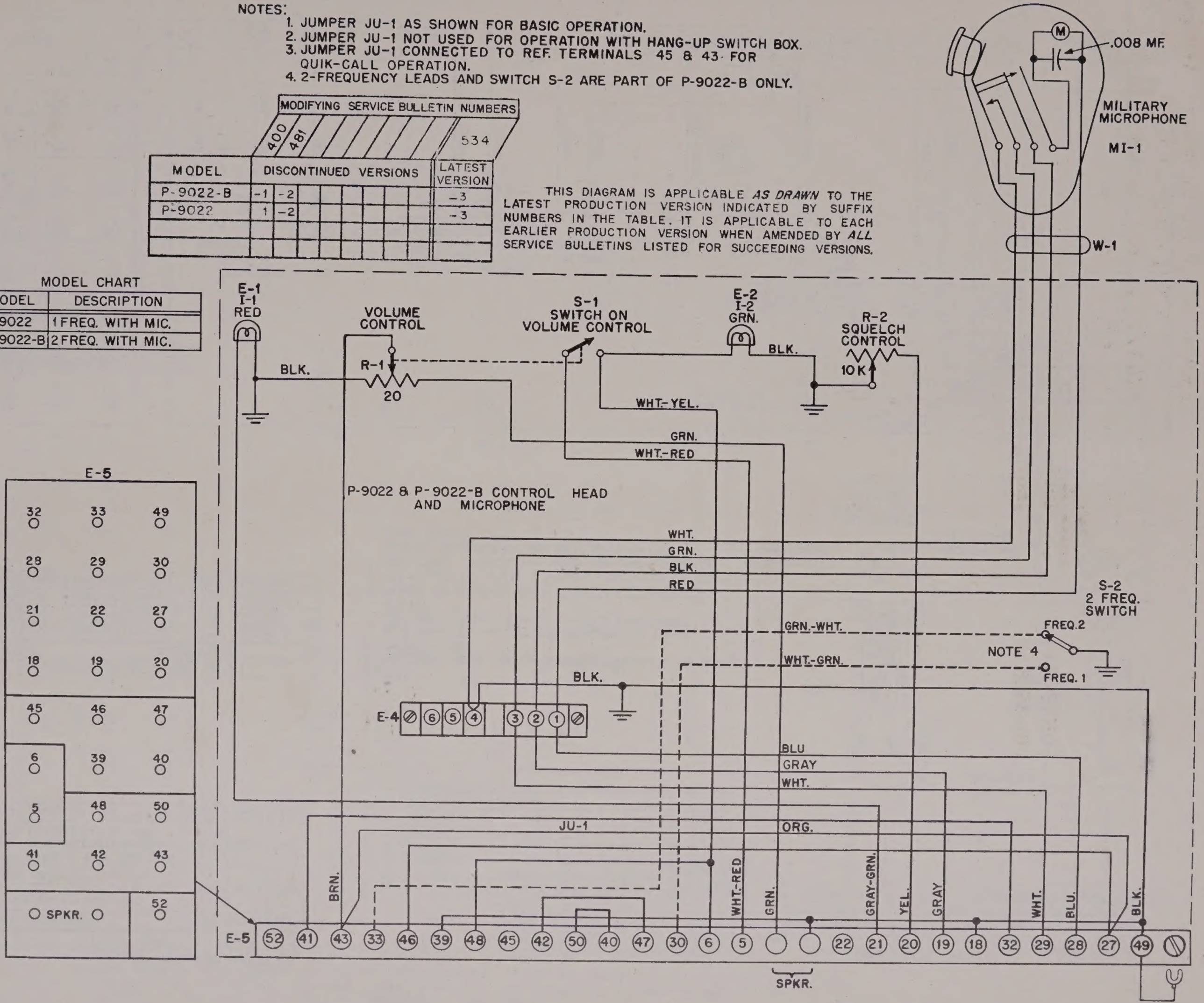
MODIFYING SERVICE BULLETIN NUMBERS

MODEL	DISCONTINUED VERSIONS 400	481							LATEST VERSION 534
P-9022-B	-1	-2							-3
P-9022	1	-2							-3

THIS DIAGRAM IS APPLICABLE *AS DRAWN* TO THE LATEST PRODUCTION VERSION INDICATED BY SUFFIX NUMBERS IN THE TABLE. IT IS APPLICABLE TO EACH EARLIER PRODUCTION VERSION WHEN AMENDED BY *ALL* SERVICE BULLETINS LISTED FOR SUCCEEDING VERSIONS.

MODEL CHART

MODEL	DESCRIPTION
P-9022	1 FREQ. WITH MIC.
P-9022-B	2 FREQ. WITH MIC.


.008 MF.
M
MILITARY MICROPHONE
MI-1
W-1
E-1
I-1
RED
BLK.
VOLUME CONTROL
R-1
20
S-1
SWITCH ON VOLUME CONTROL
E-2
I-2
GRN.
BLK.
R-2
SQUELCH CONTROL
10 K
WHT.-YEL.
GRN.
WHT.-RED
P-9022 & P-9022-B CONTROL HEAD AND MICROPHONE
WHT.
GRN.
BLK.
RED
S-2
2 FREQ. SWITCH
FREQ.2
NOTE 4
FREQ. 1
GRN.-WHT.
WHT.-GRN.
BLK.
E-4
6
5
4
3
2
1
BLU
GRAY
WHT.
JU-1
ORG.
BRN.
WHT.-RED
GRN.
GRAY-GRN.
YEL.
GRAY
WHT.
BLU.
BLK.
E-5
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SPKR.
E-5
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42
43
SPKR.
52

PART NO. 63C800256
ISSUE - M 3/54-RS

MOTOROLA SCHEMATIC DIAGRAM
MODELS P-9022-A, P-9022-C, P-9022-H AND P-9022-H-C2 CONTROL HEADS

MOTOROLA SCHEMATIC DIAGRAM CONTROL HEAD AND HANDSET

THIS DIAGRAM IS APPLICABLE *AS DRAWN* TO THE LATEST PRODUCTION VERSION INDICATED BY SUFFIX NUMBERS IN THE TABLE. IT IS APPLICABLE TO EACH EARLIER PRODUCTION VERSION WHEN AMENDED BY *ALL* SERVICE BULLETINS LISTED FOR SUCCEEDING VERSIONS.

JUMPER TABLE (NOTE 4)

	JU1	JU3	JU4
BASIC OPERATION	USED	USED	OMIT
WITH HANG UP BOX AND QUIK CALL. SPEAKER MUTED WHEN HANDSET IS IN USE.	OMIT	OMIT	OMIT
WITH HANG UP BOX AND QUIK CALL. SPEAKER NOT MUTED WHEN HANDSET IS IN USE.	OMIT	USED	OMIT
WITH HANG UP BOX	OMIT	OMIT	USED

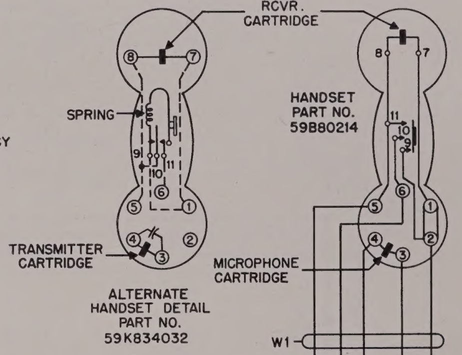
MODIFYING SERVICE BULLETIN NUMBERS	400	481							534
CHASSIS	DISCONTINUED VERSIONS								LATEST VERSION
P-9022-A	-1	-2							-3
P-9022-C	-1	-2							-3
P-9022-H	-1	-2							-3
P-9022-H-C2	-1	-2							-3

CONTROL HEAD MODEL CHART

MODEL	DESCRIPTION
P-9022-A	ONE-FREQUENCY, WITH HANDSET
P-9022-C	TWO-FREQUENCY, WITH HANDSET
P-9022-H	ONE-FREQUENCY, LESS HANDSET
P-9022-H-C2	TWO-FREQUENCY, LESS HANDSET

NOTES:

1. DOTTED LEADS AND S2 ARE USED IN TWO-FREQUENCY MODELS ONLY.
2. ALL RESISTOR VALUES ARE INDICATED IN OHMS AND ARE 10%, 1/2 WATT UNLESS OTHERWISE STATED.
3. REFER TO JUMPER TABLE FOR USE OF JUMPERS.
4. UNIT SHIPPED WITH JUMPERS CONNECTED FOR SPECIFIED OPERATION. ADD OR OMIT JUMPERS WHERE NECESSARY FOR NEW APPLICATION. (SEE TABLE)


RCVR. CARTRIDGE
SPRING
HANDSET PART NO. 59B80214
TRANSMITTER CARTRIDGE
MICROPHONE CARTRIDGE
ALTERNATE HANDSET DETAIL PART NO. 59K834032
W1
1
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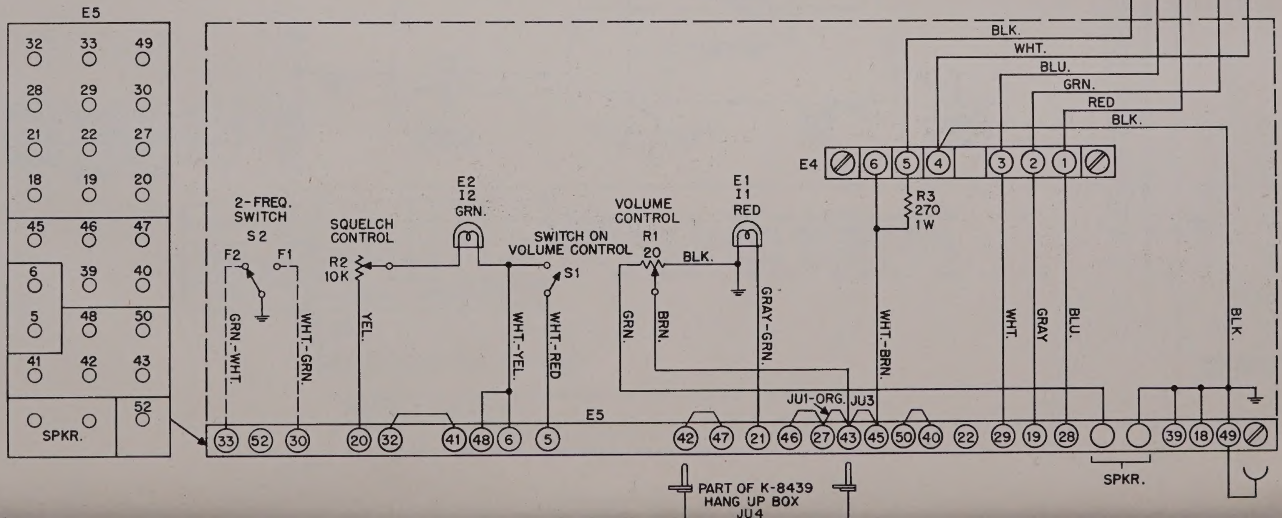
11


E5
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43
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SPKR.
2-FREQ. SWITCH S2
F2
F1
GRN.-WHT.
WHT.-GRN.
SQUELCH CONTROL
R2 10K
YEL.
E2 I2 GRN.
WHT.-YEL.
SWITCH ON VOLUME CONTROL
S1
WHT.-RED
VOLUME CONTROL R1 20
BLK.
GRN.
BRN.
E1 I1 RED
GRAY-GRN.
E4
R3 270 1W
WHT.-BRN.
BLK.
WHT.
BLU.
GRN.
RED
BLK.
WHT.
GRAY
BLU.
BLK.
JU1-ORG.
JU3
E5
SPKR.
PART OF K-8439 HANG UP BOX JU4

PART NO. 63C800257
ISSUE - M 3/54-RS

MOTOROLA SCHEMATIC DIAGRAM
MODELS P-9022-K AND P-9022-K-C2 CONTROL HEADS

JUMPER TABLE (NOTE 2)

	JU 1	JU 2	JU3	JU4
BASIC OPERATION	1 & 2	USED WITH MICROPHONE	USED WITH HANDSET	OMIT
WITH HANG-UP BOX	OMIT	OMIT	OMIT	USED
WITH HANG-UP BOX & QUIK CALL. SPKR. MUTED WHEN HANDSET IN USE.	OMIT	OMIT	OMIT	OMIT
WITH HANG-UP BOX & QUIK CALL SPKR. NOT MUTED WHEN HANDSET IS IN USE	2 & 3	OMIT	OMIT	OMIT

MODIFYING SERVICE BULLETIN NUMBERS

MODEL	DISCONTINUED VERSIONS		LATEST VERSION
	400	481	534
P-9022-K	-1	-2	-3
P-9022-K-C2	-1	-2	-3

THIS DIAGRAM IS APPLICABLE AS DRAWN TO THE LATEST PRODUCTION INDICATED BY SUFFIX NUMBERS IN TABLE. IT IS APPLICABLE TO EACH EARLIER PRODUCTION VERSION WHEN AMENDED BY ALL SERVICE BULLETINS LISTED FOR SUCCEEDING VERSIONS.

MODEL CHART

MODEL	APPLICATION
P-9022-K	1 FREQ. CONTROL
P-9022-K-C2	2 FREQ. CONTROL

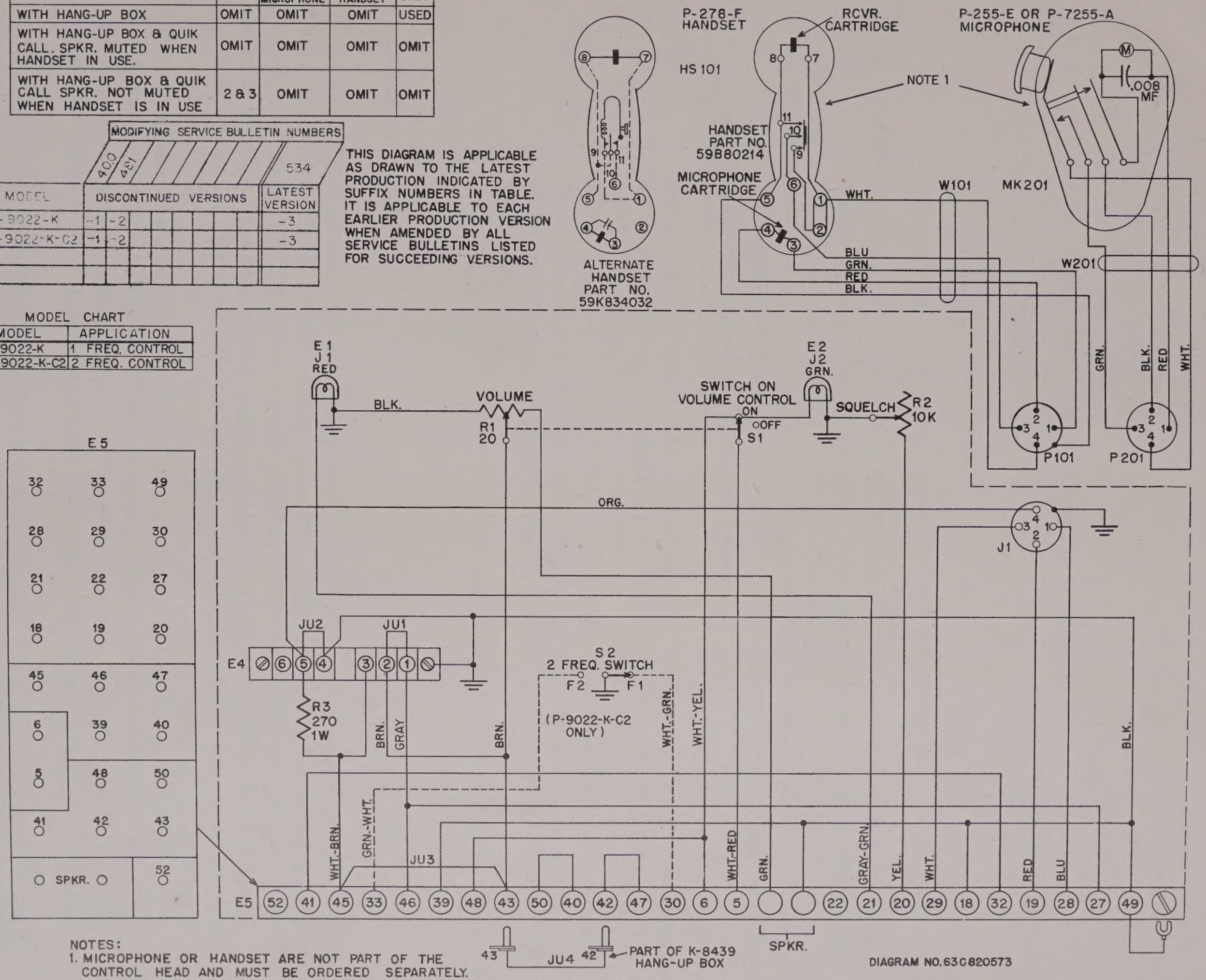
ALTERNATE HANDSET PART NO. 59K834032
P-278-F HANDSET
HS 101
RCVR. CARTRIDGE
NOTE 1
HANDSET PART NO. 59B80214
MICROPHONE CARTRIDGE
P-255-E OR P-7255-A MICROPHONE
.008 MF
MK201
W101
W201
WHT.
BLU
GRN.
RED
BLK.
P101
P201
E1
J1
RED
E2
J2
GRN.
VOLUME
R1
20
SWITCH ON VOLUME CONTROL
ON
OFF
S1
SQUELCH
R2
10K
ORG.
J1
JU2
JU1
E4
R3
270
1W
S2
2 FREQ. SWITCH
F2
F1
(P-9022-K-C2 ONLY)
BRN.
GRAY
WHT.-GRN.
WHT.-YEL.
WHT.-BRN.
GRN.-WHT.
JU3
WHT.-RED
GRN.
GRAY-GRN.
YEL.
WHT.
RED
BLU
BLK.
E5
52 41 45 33 46 39 48 43 50 40 42 47 30 6 5 22 21 20 29 18 32 19 28 27 49
SPKR.
43
JU4
42
PART OF K-8439 HANG-UP BOX
32 33 49 28 29 30 21 22 27 18 19 20 45 46 47 6 39 40 5 48 50 41 42 43
SPKR.
52

DIAGRAM NO. 63C820573

NOTES:
1. MICROPHONE OR HANDSET ARE NOT PART OF THE CONTROL HEAD AND MUST BE ORDERED SEPARATELY.
2. UNITS SHIPPED WITH JUMPERS CONNECTED FOR SPECIFIED OPERATION. WHEN OPERATION IS NOT SPECIFIED, THE UNIT WILL BE SHIPPED WITH ALL JUMPERS EXCEPT JU4 CONNECTED AS SHOWN. ADD OR OMIT JUMPERS AS REQUIRED FOR SPECIFIC OPERATION. (SEE TABLE)

PART NO. 63C820573
ISSUE - C 3/54-RS

Motorola®

THE "RESEARCH" LINE

UNIVERSAL CONTROL PANELS

MODEL	DESCRIPTION
TU190	Single-frequency transmitter-receiver control panel with military microphone; 6/12 VDC operation.
TU190-C2	Two-frequency transmitter-receiver control panel with military microphone; 6/12 VDC operation.
TU206	Single-frequency transmitter-receiver control panel with detachable microphone or handset provisions; less microphone; 6/12 VDC operation.
TU206-C2	Two-frequency transmitter-receiver control panel with detachable microphone or handset provisions; less microphone; 6/12 VDC operation.

1. DESCRIPTION

MOTOROLA Model TU190 and TU206 Series Control Panels are universal "under-the-dash" type control units providing complete control facilities for operation of MOTOROLA front mount mobile radio equipment. These control panels assemble directly to the front sub-panel of "10-inch" mobile drawer units and serve as the front cover for the specific mobile housing with which they are installed. A key lock is provided on the panels to secure the drawer assembly within the mobile housing. All electrical connections between the control panel and the mobile radio assembly are made by means of interconnect leads attached to the control panels. These leads are connected to specific terminals on the power supply chassis (see applicable intercabling diagram).

Model TU190 and TU206 Series Control Panels incorporate the following controls and indicators: power ON-OFF switch, VOLUME control, SQUELCH control, "power-on" indicator lamp and "transmitter-on" indicator lamp. Two-frequency models (-C2 versions) also include a frequency selector switch.

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In addition to operational controls, the panels also mount a 4-1/2" speaker, and specific termination facilities for connection of power and antenna lead-in cables. The controls, speaker and indicator lamps are mounted on a slanted section of the panels to provide ease of operation and a high degree of visibility. Metering ports, which permit entrance to the transmitter and receiver metering receptacles, are located under snap covers on the lower section of the panels. A handle is also provided on the lower portion of the control panels to facilitate removal of the drawer unit from the housing and for carrying.

Universal design permits use of the TU190 or TU206 Series control panels with equipment operating from either a 6 VDC or 12 VDC primary power source. Complete adaption for these diversified power applications is accomplished by use of an appropriate cable kit to accommodate specific operation.

Model TU190 and TU206 Series Control Panels differ only with regards to microphone input connections. Model TU190 Series units are supplied with a military microphone wired directly into the control panel circuit. TU206 Series units include a four-pin female receptacle for external connection of a detachable microphone or handset. A microphone or handset is not supplied with TU206 Models and must be ordered separately if required. A MOTOROLA P-255-E Military Microphone, a P-7255-A Noise Cancelling Microphone or a P-278-F Handset are recommended for use with TU206 Control Panels.

Refer to Schematic Diagram 63C835296 for complete circuit details relative to Model TU190 Series Control Panels. Refer to Schematic Diagram 63C835297 for Model TU206 Series Control Panel circuit details.

2. MULTIPLE FREQUENCY CONTROL

For multiple frequency operation of transmitter-receiver models, a frequency selector switch is provided. The standard two-frequency switch facilities provide for selection of either of two channels. Where transmitter and receiver are of a two-frequency type, the channel selection is simultaneous. For separate selection of transmitter and receiver channels, special cabling is required.

3. SERVICE NOTES

a. Removal of Control Panel

(1) Disconnect the power and antenna lead-in cables (also hang-up switch box and QUIK-CALL cables, if used).

(2) Insert the key in the lock located in the lower section of the control panel and turn the key 1/4 turn clockwise.

(3) Slide the chassis assembly out of the housing far enough to permit access to the rear of the control panel.

(4) Disconnect the antenna cable from the ANT. connector on the transmitter chassis.

(5) Remove the two Phillips Head Screws located on the top edge of the control panel.

(6) Remove the two Phillips Head Screws on the side of the control panel near the bottom.

(7) Carefully pull the control panel straight out to avoid damage to the leads connected to the power supply chassis.

CAUTION

The panel is now supported only by its leads.

(8) Snap the rubber grommet out of the hole in the front plate of the chassis mounting kit and pull the antenna lead-in through the hole.

(9) For complete removal or replacement, unsolder the leads at the power supply.

b. Mounting the Control Panel on the Chassis Assembly

(1) Route the antenna cable from the control panel through the rubber grommet provided in the front plate of the chassis assembly.

(2) Solder the leads from the control panel to the power supply as shown on the intercabling diagram if the control panel has been removed or is being replaced.

(3) Fasten the control panel to the chassis assembly.

(a) Insert the two Phillips Head Screws through the mounting holes at the top edge of the control panel and tighten securely.

(b) Insert the two Phillips Head Screws (one at each side) in the side edges of the control panel and tighten securely.

(4) Connect the antenna cable extending from the back of the control panel to the ANT. connector on the transmitter chassis.

(5) Connect the hang-up switch box and QUIK-CALL cables if used.

(6) Slide the chassis assembly into the housing and lock in place by turning the key 1/4 turn counterclockwise.

(7) Connect the power and antenna lead-in cables to the control panel.

c. Mounting the Microphone (or Handset) Bracket

(1) The TU190 Series Control Panels are supplied with a microphone hang-up bracket mounted under the Phillips Head Screw at the top left edge of the control panel. For normal installation, bracket mounting will not be required for these models.

(2) The TU206 Series Control Panels ("less microphone - with MIC connector" models) are not supplied with microphone or handset hang-up facilities. However, the MOTOROLA P-255-E Military Microphone, P-7255-A Noise Cancelling Microphone and P-278-F Handset, which are recommended for use with these panels, do include applicable hang-up facilities. To mount the hang-up bracket, use the bracket as a template to locate the mounting holes, and fasten to the appropriate surface with the two sheet metal screws supplied. For mobile installations, the hang-up bracket is generally mounted to the vehicle dash board. The bracket may be mounted under the Phillips Head Screw at the top left edge of the control panel if desired.

4. TRANSMITTER INPUT CONSIDERATIONS

When a control panel with military microphone is used, the shielded input lead to the grid of the 1st IDC amplifier on the transmitter must be connected to the Pos. 1 tap on the input divider (see applicable transmitter schematic diagram). When a control panel with handset is used, the shielded lead must be connected to Pos. 2 on the divider network.

> NOTE
>
> If a handset is ordered with a mobile station incorporating a TU206 Series Control Panel the transmitter will be wired for handset operation at the factory. If the mobile station is ordered without a handset, or with either a military or noise cancelling type microphone, the transmitter will be connected for microphone input.

5. JUMPER CONSIDERATIONS

Jumper provisions are incorporated on all control panels to accommodate diversified application. Control panels shipped as part of standard mobile station models and/or with specific optional accessories (QUIK-CALL, Hang-Up Box, detachable microphone or handset, etc.) will be jumpered at the factory to facilitate intended operation. Control panels shipped separately, on orders where application is not specified, must be jumpered in the field to accommodate specific operation (all jumpers included with control panel when shipped). Refer to the applicable control panel schematic diagram for proper jumper connections.

6. SCHEMATIC DIAGRAM PARTS LIST

a. TU190	Speaker and Control Panel (DC) 1-Freq.
TU190-C2	Speaker and Control Panel (DC) 2-Freq.
TU206	Speaker and Control Panel (DC) 1-Freq. (with MIC, connector)
TU206-C2	Speaker and Control Panel (DC) 2-Freq. (with MIC, connector)

REFERENCE:
Schematic Diagrams

TU190	63C835296
TU190-C2	63C835296
TU206	63C835297
TU206-C2	63C835297

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		LAMP,
I 1	65X4151	Incandescent: 6-8 volt; .2 ampere; miniature single contact bayonet base; globe shape bulb
I 2		Same as I 1
		CONNECTORS,
J 1	9A85615	Receptacle: female; single contact; round molded mica filled insulator; square metal chassis mounting base; does not include 15A483599 SHELL, connector; which must be ordered separately; p/o W 2
J 2	28B834755	Receptacle: male; 6 contact; polarized; rectangular molded black phenolic base; chassis saddle mounting
J 3	9B16345	Receptacle: female; 4 contact; polarized; round molded phenolic insulator; chassis mounted; used only in Models TU206, TU206-C2
		SPEAKER,
LS 1	50C800112	Magnetic: impedance; 3.2 ohm; 4"
		MICROPHONE,
MK 1	50B890923	Carbon: single button; push-to-talk switch; military type; includes reference part W 1; used only in Models TU190, TU190-C2
		CONNECTOR,
P 1	28K474006	Plug: male; single contact; round bakelite wafer base; cable mounted; p/o W 2

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		RESISTORS,
R 1	18A890193	Variable: wire wound; 10,000 ohm ±10%; 2 w
R 2	18A822378	Variable: carbon; 500,000 ohm ±10%; 2.25 w; max.
R 3	17B834758	Fixed: wire wound; .03 ohm +10-15%; 30 w; ins.
R 4	6R6336	Fixed: carbon; 270 ohm ±10%; 1 w; ins.; used only in Models TU206, TU206-C2
		SWITCHES,
S 1	40A80248	Toggle: S.P.D.T.; used only in Models TU190-C2, TU206-C2
	or 40K811824	Toggle: S.P.D.T.; used only in Models TU190-C2, TU206-C2
S 2	40B834757	Toggle: 3P-S.T.
		BOARDS,
TB 1	31A890699	Terminal: 6 screw terminals; used only in Models TU190, TU190-C2
TB 2	31K51251	Terminal: 1 insulated; 1 ground soldering lug terminals; used only in Models TU206, TU206-C2
		CORD,
W 1	30B891505	Microphone: coiled; 4 conductor; conductors color coded RED, BLACK, GREEN, WHITE; one end 4 spade lugs and numbered bands 1 thru 4, opposite end stripped only; includes strain clip; p/o MK 1; used only in Models TU190, TU190-C2
		LINE,
W 2	1V800103	RF: transmission; to antenna relay connector; includes; 30K475378 CABLE, RF: coaxial; RG-58A/U; 5-1/2" length required Includes reference parts J 1, P 1
		LAMPHOLDER,
XI 1	60K890182	Miniature: single contact bayonet base
XI 2		Same as XI 1

b. Optional Accessories (Not Supplied)

(1) P-278-F HANDSET MICROPHONE

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
HS 101	1V84353	HANDSET & CABLE ASSEMBLY, Consisting of: 59B80214 HANDSET: carbon; transmitter cartridge; 30 ohm; receiver cartridge 137 ohm at 1000 cycle or 59K834032 HANDSET: carbon; transmitter cartridge 30 ohm; receiver cartridge 137 ohm at 1000 cycle Includes reference part W 101
P 101	28A16370	CONNECTOR, Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o W 101
W 101	1V84354	HANDSET CABLE ASSEMBLY, Includes: 30K84270 CORD, handset: coiled; 5 conductors, conductors color coded; BLACK, WHITE, RED, GREEN, BLUE; both ends of cord are stripped only Includes reference part P 101

(2) P-255-E MILITARY MICROPHONE
P-7255-A MILITARY MICROPHONE (Noise Cancelling)

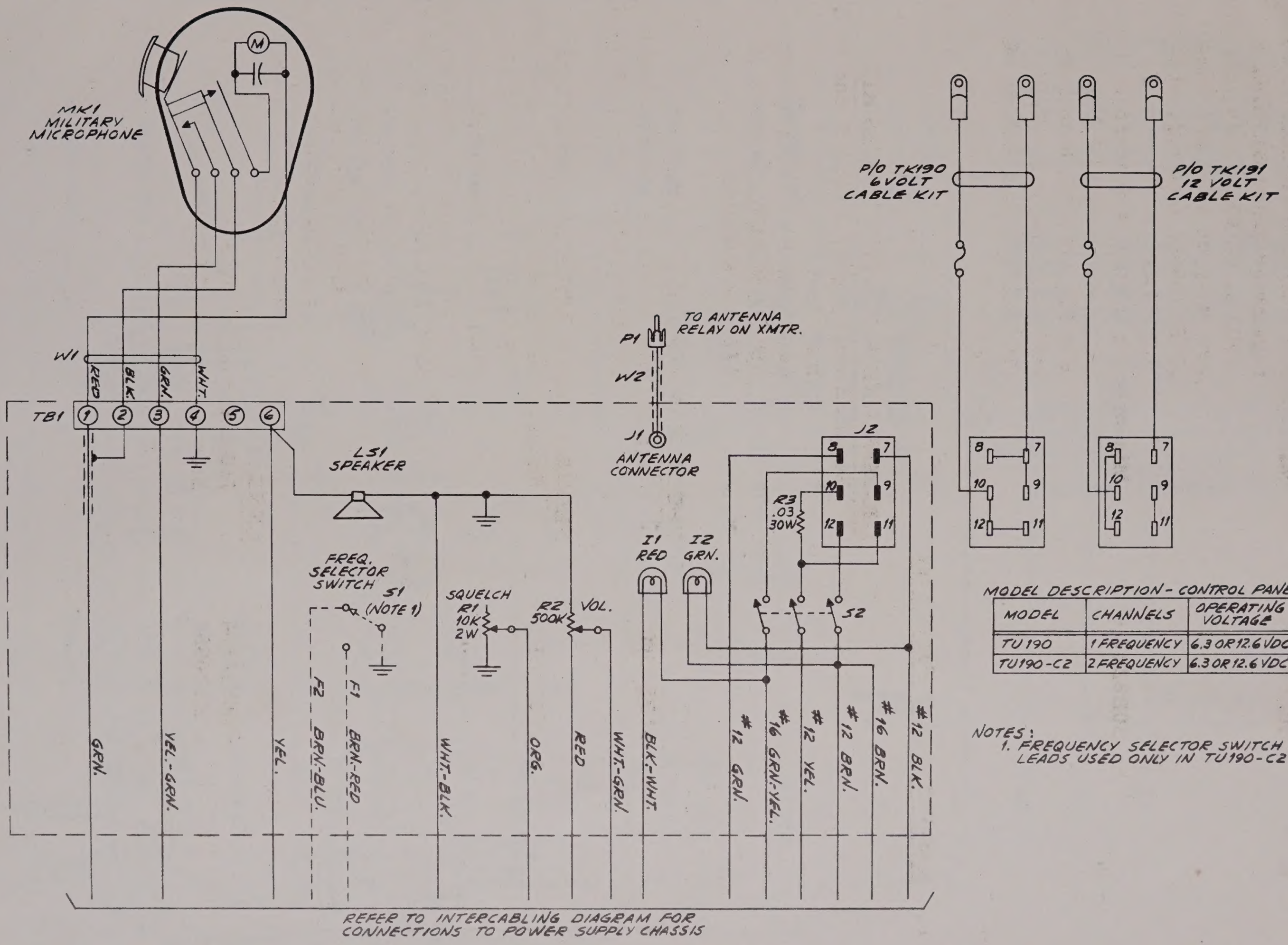
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
MK 201	50C822727	MICROPHONE, Carbon: push-to-talk switch; Military Type; includes reference parts P 201 and W 201 (30B822726) (Used only for Model P-255-E)
	or 1V475678	MICROPHONE & CONNECTOR ASSEMBLY: Includes: 59B475596 MICROPHONE, carbon; single button; Military Type; push-to-talk switch; includes reference part W 201 (Assembly used only for Model P-7255-A)
P 201	28A16370	CONNECTOR, Plug: male; 4 contact; polarized; cylindrical; cable mounted; p/o MK 201

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CORD,
W 201	30B84269	Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord are stripped only; p/o MK201 (59B475596) used only in Model P-7255-A
	or 30B822726	Microphone: coiled; 4 conductor; conductors color coded BLACK, RED, WHITE, GREEN; both ends of cord stripped only; p/o MK201 (50C822727) used only in Model P-255-E

c. Non-Referenced Parts List

		MICROPHONE MOUNTING PARTS KIT,
	1V16241	Supplied with Models P-255-E and P-7255-A Includes: 64A85596 PLATE, support 3S8101 SCREW, tapping: 8-15 x 1/2"; 2 supplied
		PHONE HANGER ASSEMBLY,
	51B83300	Supplied with Model P-278-F; requires 1V83301 MOUNTING PARTS KIT
		PHONE HANGER MOUNTING PARTS KIT,
	1V83301	Supplied with Model P-278-F; used with 51B83300 PHONE HANGER ASSEMBLY; includes: 64A83334 PLATE, reinforcing 3S7453 SCREW, tapping: #8 x 1"; 2 supplied 3S6943 SCREW, machine: 8-32 x 1-1/4"; 2 supplied 4S8411 LOCKWASHER, internal: #8; 2 supplied
		LENS,
	60K890184	Indicator light: RED
	60K890588	Indicator light: GREEN

MOTOROLA SCHEMATIC DIAGRAM
TU190 SERIES CONTROL PANELS


MK1
MILITARY
MICROPHONE
W1
RED
BLK.
GRN.
WHT.
TB1
1
2
3
4
5
6
LS1
SPEAKER
P1
W2
J1
TO ANTENNA
RELAY ON XMTR.
ANTENNA
CONNECTOR
J2
8
7
10
9
12
11
R3
.03
30W
I1
RED
I2
GRN.
FREQ.
SELECTOR
SWITCH
S1
(NOTE 1)
SQUELCH
R1
10K
2W
R2
500K
VOL.
S2
F1
F2
GRN.
YEL.-GRN.
YEL.
BRN.-BLU.
BRN.-RED
WHT.-BLK.
ORG.
RED
WHT.-GRN.
BLK.-WHT.
#12 GRN.
#16 GRN.-YEL.
#12 YEL.
#12 BRN.
#16 BRN.
#12 BLK.
P/O TK190
6 VOLT
CABLE KIT
P/O TK191
12 VOLT
CABLE KIT
REFER TO INTERCABLING DIAGRAM FOR
CONNECTIONS TO POWER SUPPLY CHASSIS

MODEL DESCRIPTION - CONTROL PANELS

MODEL	CHANNELS	OPERATING VOLTAGE
TU190	1 FREQUENCY	6.3 OR 12.6 VDC
TU190-C2	2 FREQUENCY	6.3 OR 12.6 VDC

NOTES:
1. FREQUENCY SELECTOR SWITCH AND LEADS USED ONLY IN TU190-C2.

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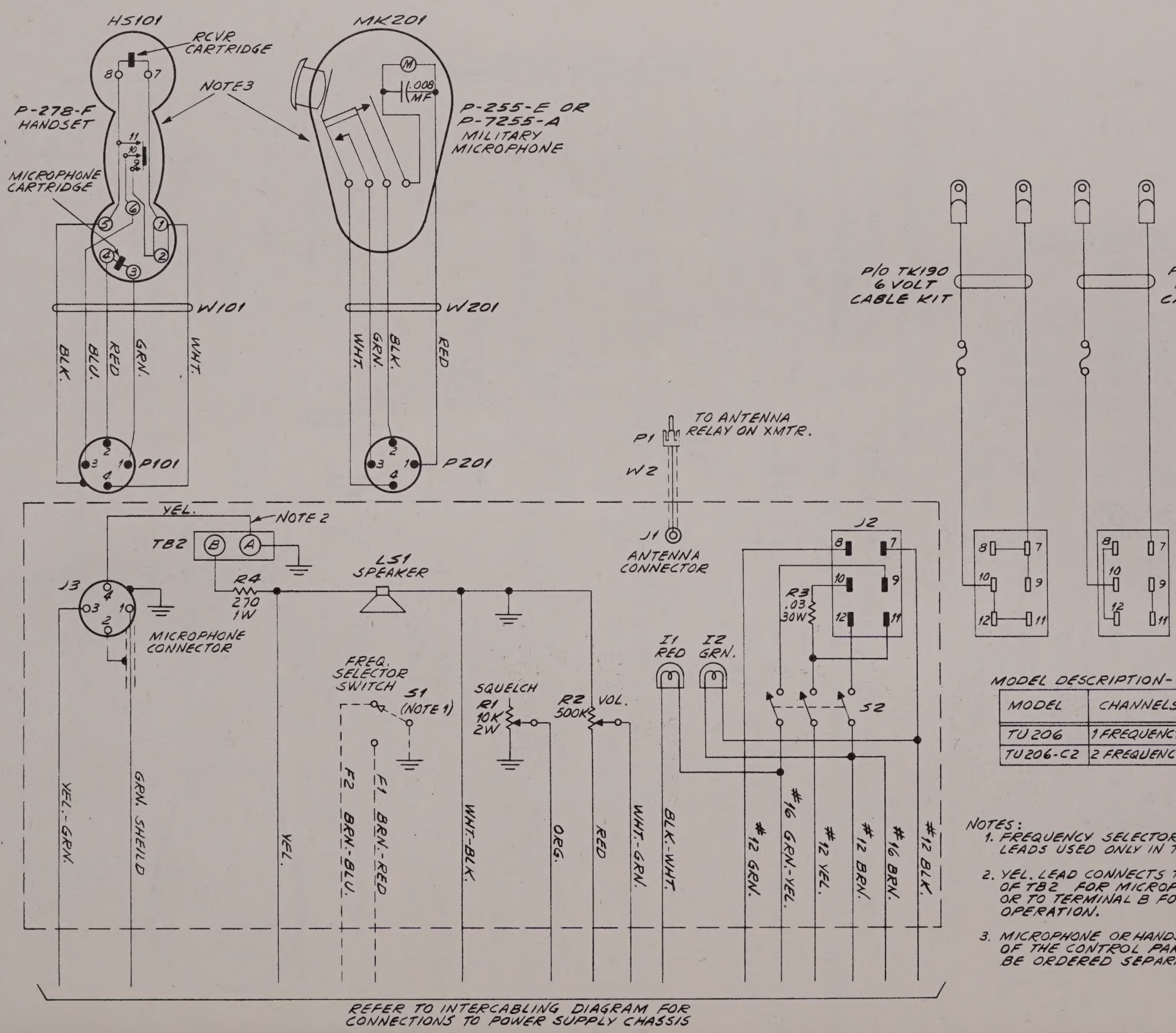
MOTOROLA SCHEMATIC DIAGRAM
TU206 SERIES CONTROL PANELS


HS101
RCVR CARTRIDGE
NOTE3
P-278-F HANDSET
MICROPHONE CARTRIDGE
W101
BLK.
BLU.
RED
GRN.
WHT.
P101
MK201
.008 MF
P-255-E OR
P-7255-A
MILITARY MICROPHONE
W201
WHT.
GRN.
BLK.
RED
P201
P/O TK190 6 VOLT CABLE KIT
P/O TK191 12 VOLT CABLE KIT
TO ANTENNA RELAY ON XMTR.
P1
W2
J1
ANTENNA CONNECTOR
YEL.
NOTE 2
TB2
J3
R4 270 1W
MICROPHONE CONNECTOR
LS1 SPEAKER
FREQ. SELECTOR SWITCH
S1 (NOTE 1)
SQUELCH
R1 10K 2W
R2 500K
VOL.
I1 RED
I2 GRN.
J2
R3 .03 30W
S2
YEL.-GRN.
GRN. SHEILD
YEL.
F2 BRN.-BLU.
F1 BRN.-RED
WHT.-BLK.
ORG.
RED
WHT.-GRN.
BLK.-WHT.
#12 GRN.
#16 GRN.-YEL.
#12 YEL.
#12 BRN.
#16 BRN.
#12 BLK.
REFER TO INTERCABLING DIAGRAM FOR CONNECTIONS TO POWER SUPPLY CHASSIS

MODEL DESCRIPTION-CONTROL PANELS

MODEL	CHANNELS	OPERATING VOLTAGE
TU206	1 FREQUENCY	6.3 OR 12.6 VDC
TU206-C2	2 FREQUENCY	6.3 OR 12.6 VDC

NOTES:

1. FREQUENCY SELECTOR SWITCH AND LEADS USED ONLY IN TU206-C2.
2. YEL. LEAD CONNECTS TO TERMINAL A OF TB2 FOR MICROPHONE OPERATION OR TO TERMINAL B FOR HANDSET OPERATION.
3. MICROPHONE OR HANDSET IS NOT PART OF THE CONTROL PANEL AND MUST BE ORDERED SEPARATELY.

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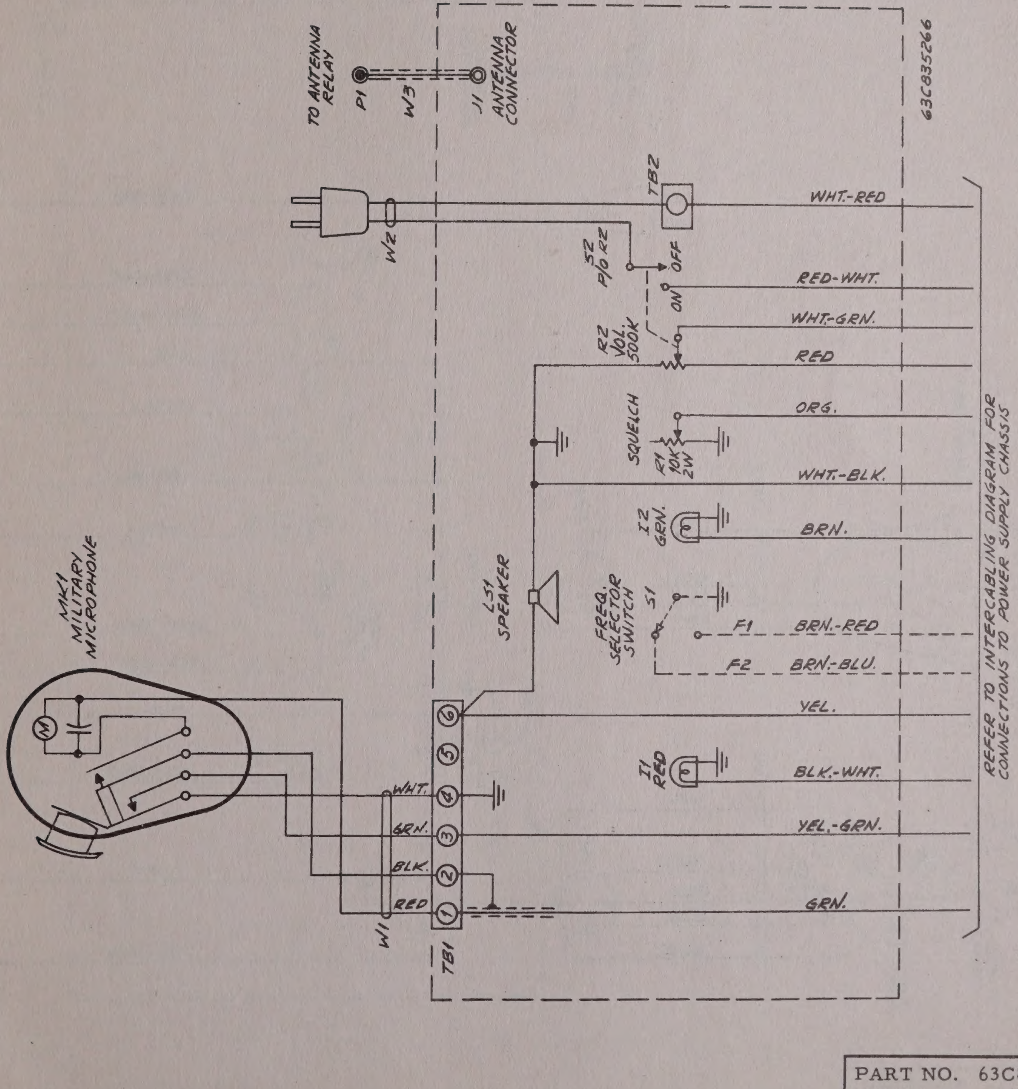
MOTOROLA SCHEMATIC DIAGRAM
TU207 SERIES CONTROL PANELS

MODEL DESCRIPTION-CONTROL PANELS

MODEL	CHANNELS	OPERATING VOLTAGE
TU 207	1 FREQUENCY	117 VAC
TU207-C2	2 FREQUENCY	117 VAC


TO ANTENNA RELAY
P1
W3
J1 ANTENNA CONNECTOR
63C835266
W2
TB2
WHT.-RED
S2 P/O R2
OFF
ON
RED-WHT.
R2 VOL. 500K
WHT.-GRN.
RED
SQUELCH
R1 10K 2W
ORG.
WHT.-BLK.
I2 GRN.
BRN.
MK1 MILITARY MICROPHONE
M
LS1 SPEAKER
FREQ. SELECTOR SWITCH
S1
F1
BRN.-RED
F2
BRN.-BLU.
YEL.
I1 RED
BLK.-WHT.
YEL.-GRN.
GRN.
WHT.
GRN.
BLK.
RED
W1
TB1
1
2
3
4
5
6
REFER TO INTERCABLING DIAGRAM FOR CONNECTIONS TO POWER SUPPLY CHASSIS

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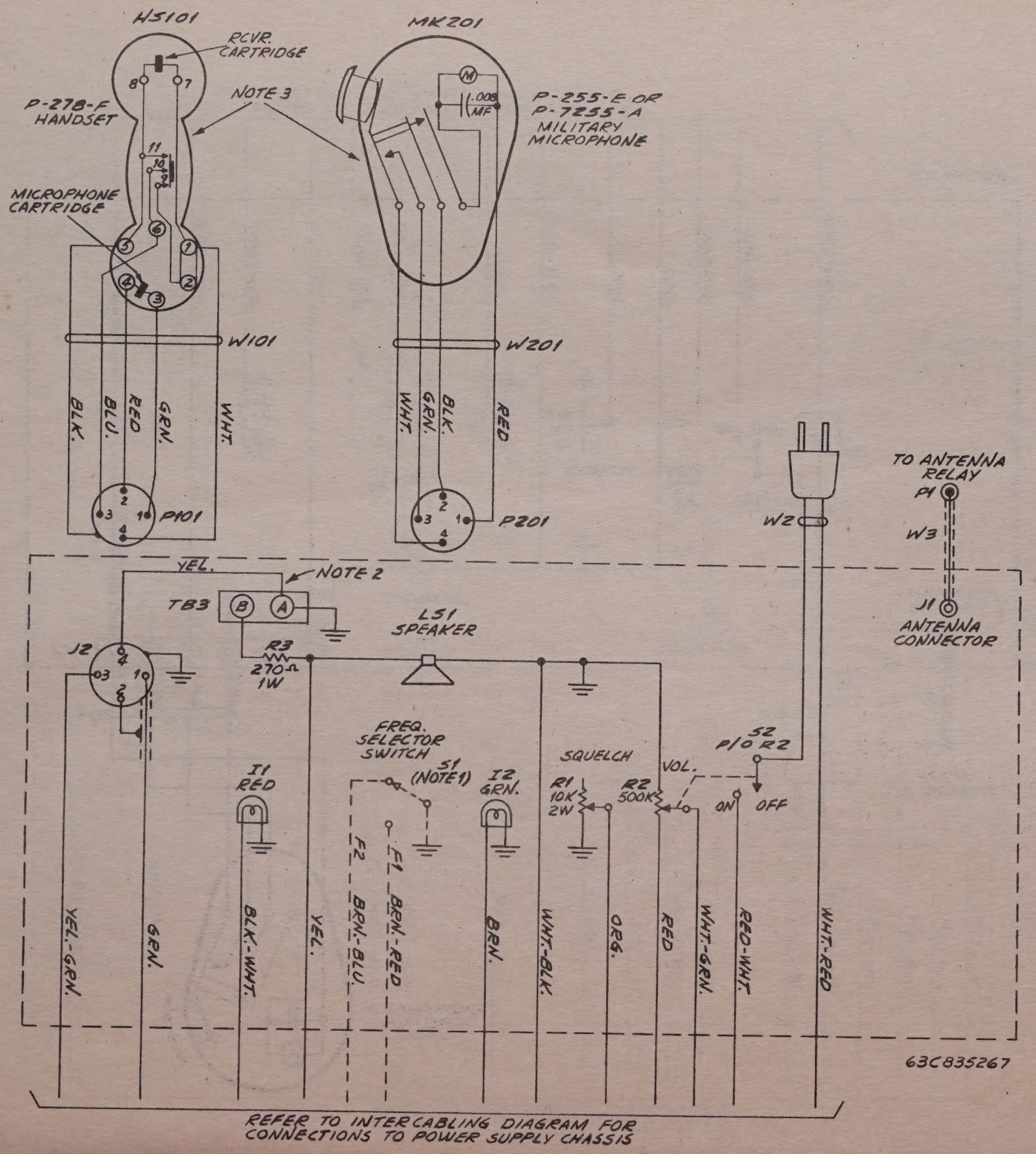
MOTOROLA SCHEMATIC DIAGRAM
TU208 SERIES CONTROL HEADS


HS101
RCVR. CARTRIDGE
P-278-F HANDSET
NOTE 3
MICROPHONE CARTRIDGE
MK201
.008 MF
P-255-E OR P-7255-A MILITARY MICROPHONE
W101
W201
BLK.
BLU.
RED
GRN.
WHT.
P101
P201
W2
TO ANTENNA RELAY
P1
W3
J1 ANTENNA CONNECTOR
YEL.
NOTE 2
TB3
J2
R3 270Ω 1W
LS1 SPEAKER
FREQ. SELECTOR SWITCH
S1 (NOTE 1)
I1 RED
I2 GRN.
SQUELCH
R1 10K 2W
R2 500K
VOL.
S2 P/O R2
ON
OFF
F1
F2
YEL.-GRN.
GRN.
BLK.-WHT.
YEL.
BRN.-BLU.
BRN.-RED
BRN.
WHT.-BLK.
ORG.
RED
WHT.-GRN.
RED-WHT.
WHT.-RED
63C835267
REFER TO INTERCABLING DIAGRAM FOR CONNECTIONS TO POWER SUPPLY CHASSIS

MODEL DESCRIPTION-CONTROL PANELS

MODEL	CHANNELS	OPERATING VOLTAGE
TU208	1 FREQUENCY	117 VAC
TU208-C2	2 FREQUENCY	117 VAC

NOTES:

1. FREQUENCY SELECTOR SWITCH AND LEADS USED ONLY IN TU208-C2.
2. YEL. LEAD CONNECTS TO TERMINAL A OF TB FOR MICROPHONE OPERATION OR TO TERMINAL B FOR HANDSET OPERATION.
3. MICROPHONE OR HEADSET IS NOT PART OF THE CONTROL PANEL AND MUST BE ORDERED SEPARATELY.

PART NO. 63C835267
ISSUE - O 3/54-UM